REPORT N^{O} 141-20688-00_RPT-02_R1

TECHNICAL REPORT AND UPDATE OF THE PRELIMINARY ECONOMIC ASSESSMENT ON THE ENCHI GOLD PROJECT

ENCHI, GHANA

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Pinecrest Resources Ltd.

Project no: 141-20688-00_RPT-02_R1

Issue Date: January 27, 2016
Effective Date: June 30, 2015

Prepared by:

Todd McCracken, P.Geo	WSP Canada Inc.
Joanne Robinson, P.Eng.	WSP Canada Inc.
Mireno Dhe Paganon, Eng.	WSP Canada Inc.
Bruce White, Pr.Eng.	WSP Group Africa (Pty) Ltd.
Jean-Sébastien Houle, Eng.	WSP Canada Inc.

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WSP Canada Inc.
2565 Kingsway, Unit 2
Sudbury, ON   P3B 2G1

Phone: +1 705-674-0119
Fax: +1 705-674-0125
www.wspgroup.com

SIGNATURES

PREPARED BY

“Original document signed and stamped
by Todd McCracken, P.Geo.”
Todd McCracken, P.Geo.
Manager - Geology

“Original document signed and stamped
by Joanne Robinson, P.Eng.”
Joanne Robinson, P.Eng.
Principal Mining Engineer

“Original document signed and stamped
by Mireno Dhe Paganon, Eng.”
Mireno Dhe Paganon, Eng.
Process Engineer

“Original document signed and stamped
by Bruce White, Pr.Eng.”
Bruce White, Pr. Eng.
Civil Engineer

“Original document signed and stamped
by Jean-Sébastien Houle, Eng.”
Jean-Sébastien Houle, Eng.
Project Director

REVISION HISTORY

Rev. No	Issue date	Prepared by	Reviewed by	Approved by	Description of revision
R0	1/15/2016	Joanne Robinson	Todd McCracken		First draft to Client.
R1	1/27/2016	Joanne Robinson	Todd McCracken	Todd McCracken	Updated with Client comments.

TABLE OF CONTENTS

TABLES

FIGURES

ABBREVIATIONS

UNITS OF MEASURE

above mean sea level	amsl
acre	ac
ampere	A
annum (year)	a
billion	B
billion tonnes	Bt
billion years ago	Ga
British thermal unit	BTU
Centimetre	cm
cubic centimetre	cm^3
cubic feet per minute	cfm
cubic feet per second	ft^3/s
cubic foot	ft^3
cubic inch	in
cubic metre	m^3
cubic yard	yd^3
Coefficients of Variation	Cvs
day	d
days per week	d/wk
days per year (annum)	d/a
dead weight tonnes	DWT
decibel adjusted	Ba
decibel	dB
degree	°
degrees Celsius	°C
diameter	ø
dollar (American)	US$
dollar (Canadian)	CAN$
dry metric tonne	mt
foot	ft
gallon	gal
gallons per minute	gpm
Gigajoule	GJ
Gigapascal	GPA
Gigawatt	GW
Gram	g
grams per litre	g/L
grams per tonne	g/t
greater than	>
hectare (10,000 m2)	ha
hertz	Hz
horsepower	hp
hour	h
hours per day	h/d
hours per week	h/wk
hours per year	h/a
inch	in
kilo (thousand)	k
kilogram	kg
kilograms per cubic metre	kg/m^3
kilograms per hour	kg/h
kilograms per square metre	kg/m^2
kilometre	km
kilometre	km
kilometres per hour	km/h
kilopascal	kPa
kiloton	kt
kilovolt	kV
kilovolt-ampere	kVa
kilowatt	kW
kilowatt hour	kWh
kilowatt hours per tonne	kWh/t
kilowatt hours per year	kWh/a
less than	<
litre	L
litres per minute	L/m
megabytes per second	Mb/s
megapascal	Mpa
megavolt-ampere	Mva
megawatt	MW
metre	m
metres above sea level	masl
metres Baltic sea level	mbsl
metres per minute	m/min
metres per second	m/s
microns	µm
milligram	mg
milligrams per litre	mg/L
millilitre	mL
millimetre	mm
million	M
million bank cubic metres	Mbm^3
million bank cubic metres per annum	Mbm3/a
million tonnes	Mt
minute (plane angle)	'
minute (time)	min
month	mo
ounce	oz
pascal	Pa
centipoise	mPa·s
parts per million	ppm
parts per billion	ppb

percent...%
pound(s)...lb
pounds per square inch...psi
revolutions per minute...rpm
second (plane angle)..."
second (time)...s
short ton (2,000 lb)...st
short tons per day...st/d
short tons per year...st/y
specific gravity...SG
square centimetre...cm^2
square foot...ft^2
square inch...in^2
square kilometre...km2
square metre...m^2
three-dimensional...3D
tonne (1,000 kg) (metric ton)...t
tonnes per day...t/d
tonnes per hour...t/h
tonnes per year...t/a
tonnes seconds per hour metre cubed...ts/hm^3
volt...V
week...wk
weight/weight...w/w
wet metric ton...wmt

ACRONYMS

ADR...adsorption-desorption-recovery
Ai...Abrasion Index
BOQ...Bill of Quantity
CEPA...Centre for Policy Analysis
CIC...Carbon-in-Column
CIM...Canadian Institute of Mining, Metallurgy and Petroleum
CP...Companion Policy
CRM...Certified Reference Material
CWi...Bond Crushability Work Index
DIBK...di-isobutyl ketone
DTM...Digital Terrain Model
EAR...Environmental Assessment Regulations
ECG...Electricity Commission of Ghana
ECZ...East Contact Zone
EDM...Electronic Distance Measurement
EMP...Environmental Management Plan
EPA...Environmental Protection Agency
EPAA...Environmental Protection Agency Act
EPCM...Engineering, Procurement, Construction Management
ESIA...Environmental and Social Impact Assessment
F1...Form 1
ID^2...Inverse Distance Squared
IFC...International Finance Corporation
Kinross...Kinross Gold Corporation
LIDAR...Light Detection and Ranging
LOM...Life-of-Mine
Leo Shield...Leo Shield Exploration Ghana NL
LOI...Letter of Intent
MB...Volcanic
MCZ...Main Contact Zone
Mutual...Mutual Ghana Ltd.
NI...National Instrument
NN...Nearest Neighbour
NSR...Net Smelter Royalty
NSZ...Nyamebekyere Shear Zone

NYAM .... Nyamebekyere
OK .... Ordinary Krig
PEA .... Preliminary Economic Assessment
PFS .... Pre-Feasibility Study
PLS .... Pregnant Leach Solution
the Project .... Enchi Gold Project
the Property .... Enchi Gold Project
PVC .... Polyvinyl-chloride
QA/QC .... Quality Assurance/Quality Control
QP .... Qualified Person
QV .... Quartz Vein
RAB .... Rotary Air Blast
RBMGL .... Red Back Mining Group Limited
RC .... Reverse Circulation
Red Back .... Red Back Mining Inc.
RF .... Revenue Factor
ROM .... Run-of-Mine
SETO .... Sewum-Tokosea Mine Trend
SHS .... Hilltop Shear
SPG .... Graphitic Phyllite
SPH .... Turbidite
SRM .... Standard Reference Material
SRTSZ .... Sewum Ridgetop Shear Zone
SRZ .... Road Zone
SVC .... Volcaniclastic
SWZ .... Sewum West Zone
UTM .... Universal Transverse Mercator
WCZ .... West Contact Zone
WGS .... World Geodetic System
WRC .... Water Resources Commission
WSP .... WSP Canada Inc.

1 SUMMARY

1.1 INTRODUCTION

WSP Canada Inc. (WSP) was retained by Pinecrest Resources Ltd. (Pinecrest) to prepare a Preliminary Economic Assessment (PEA) for the Enchi Gold Project (the Project or the Property), located in southwestern Ghana. This report has been prepared to comply with disclosure and reporting requirements set forth in National Instrument 43-101 (NI 43-101), Form 43-101F1 of NI 43-101 (NI 43-101F1) and Standards of Disclosure for Mineral Projects, Companion Policy 43-101CP (NI43-101CP) to NI 43-101. The purpose of this PEA is to:

→ Update the preliminary economic evaluation in WSP's report titled "Technical Report and Preliminary Economic Assessment on the Enchi Gold Project, Enchi, Ghana", dated June 29 2015, which was based on an Owner-Operated costing scenario, with an additional costing scenario that represents the use of a contractor for mining operations.

This PEA presents two costing option scenarios:

1. Owner Operated scenario whereby both mining and processing operations are undertaken by the Project owner.
2. Contract Mining scenario whereby the open pit mining operations are undertaken by a contractor while the processing and other site operations are undertaken by the Project owner.

The resource estimate, mine plan, and 3 million tonnes per year (Mt/a) heap leach processing scenario described in the June 2015 report remain unchanged in this report.

On December 5, 2014 Pinecrest announced that it had completed the acquisition of a 100% interest in the Enchi Gold Project from Edgewater Exploration Ltd. and Red Back Mining Ghana Limited, an indirect wholly-owned subsidiary of Kinross Gold Corporation. The Project area is comprised of ten licenses totaling 696 km^2.

WSP visited the property on September 23, 2014 and in April 2014.

All currency values are reported in US Dollars (US$), unless otherwise indicated.

1.2 PEA CONCLUSIONS

The present study indicates that the Project has positive economics, within the parameters of a PEA, for both the Owner Operated and Contract Mining scenario options. The key financial indicators, based on future gold prices and capital and operating cost estimates, justify advancing the Project to a Pre-Feasibility study stage and undertaking the work outlined in Section 26 – Recommendations. It is WSP's opinion that additional exploration and engineering test work expenditures are warranted to improve the understanding of the Project and delineate additional resources.

Table 1.1 summarizes key project results for the two cost scenarios evaluated. Compared to the original Owner Operated scenario (WSP, 2015), which remains unchanged in this report, this updated PEA indicates that the Contract Mining scenario presents a lower NPV but a higher IRR and shorter payback period.

Table 1.1 Key Project Results

Category	Units	Owner Operated Scenario	Contract Mining Scenario
Mining			
Mine Life	years	8.7	8.7
Total Material Mined	kt	102,751	102,751
Waste Material	kt	78,021	78,021
Heap Leach Feed	kt	24,729	24,729
Average Grade	g/t	0.91	0.91
Strip Ratio		3.16	3.16
Processing			
Annual Production	kt/a	3,000	3,000
Average Recovery (Oxides / Transition / Fresh)	%	74.7 (75 / 75 / 73)	74.7 (75 / 75 / 73)
Recovered Gold	oz	538,450	538,450
Economics			
Gold Price	US$/oz	1,300	1,300
LOM Total Operating Cost	US$/t feed	15.45	18.92
LOM Total Operating Cost	US$/oz	710	869
Total Capital Costs and Contingencies	US$ K	123,007	83,989
Pre-Tax NPV @ 5% Discount Rate	US$ K	102,540	73,413
Pre-Tax IRR	%	34	44
Payback Period (pre-tax)	years	2.8	2.3
Post-Tax NPV @ 5% Discount Rate	US$ K	62,399	44,767
Post-Tax IRR	%	25	31
Payback Period (post-tax)	years	3.4	2.6

The Mineral Resources used in the Life-of-Mine (LOM) plan and economic analysis include inferred resources. Inferred mineral resources are considered speculative geologically to have economic considerations applied to them to be categorized as mineral reserves, and there is no certainty that the inferred resources will be upgraded to a higher resource category, or that the results of this preliminary assessment will be realized.

When ranked, the sensitivity analysis indicates that the Project is most sensitive to gold price and gold recovery. From a cost perspective, the Project is more sensitive to operating expenditure than capital costs.

Some key areas of risk or uncertainty that need to be addressed in subsequent study phases include:

- Additional geological studies are required to upgrade the inferred resources to indicated or measured resources.
- Additional metallurgical test work is required to determine heap leach amenability and metallurgical behaviour of the oxide, transition, and sulphide zones.

- Conduct a geotechnical drill program, ideally in conjunction with geological drill program, to confirm and assess pit slope angle assumptions and assess rock mass strength.

1.3 TECHNICAL SUMMARIES

1.3.1 GEOLOGY AND MINERAL RESOURCES

The Project is located in southwestern Ghana, in a region well known for prolific gold production, and hosts numerous historical and current operating mines located along strike to the northeast of the Project. In 2010, Ghana was the second largest gold producer in Africa at 2.97 Moz. The Project covers a 50 km strike length of the Bibiani Shear Zone along the eastern margin of the Sefwi Belt stretching from the Côte d'Ivoire border in the southwest to the southern margin of the Suhuma Forest Reserve to the northeast. The Bibiani shear is known to host significantly large lode-gold deposits such as Bibiani and Chirano.

The Project is located 290 km west of the capital of Accra and 70 km southwest of the Chirano Gold Mine operated by Kinross Gold Corporation (Kinross). The Project is centered on 5°47' North latitude and 2°42' West longitude.

In April 2014, WSP was commissioned by Edgewater Exploration Ltd. (Edgewater) to complete a resource estimate and technical report on the Property. This report complied with disclosure and reporting requirements set forth in National Instrument 43-101 (NI 43-101), Form 43-101F1 of NI 43-101 (NI 43-101F1) and Standards of Disclosure for Mineral Projects, Companion Policy 43-101CP (NI43-101CP) to NI 43-101. This work was taken over by Pinecrest prior to the final issuing of the technical report.

The Project is situated on the contact between the Sefwi Belt to the west and the Kumasi Basin to the east. The Sefwi Belt is dominated by mafic volcanics, metasediments, and intrusive granitoids. The Kumasi Basin contains wide basins of marine clastic sediments. All the rocks of the region have been extensively metamorphosed to greenschist facies.

Extensive faulting, on local and regional scales, occurs along the margins of the volcanic-sedimentary belts. These northeast-trending structures are fundamentally important in the development of the gold deposits for the region. The major shear system within the Project area is located at the boundary of the Sefwi Belt and the Kumasi Basin, and is called the Bibiani Shear Zone. Gold deposits are typically located on second or third order structured or splay off the Bibiani Shear.

The Project contains mineralized zones that are characteristic of mesothermal quartz vein style gold deposits. This type of mineralization is the most important type of gold occurring within West Africa and is commonly referred to as the Ashanti-type.

Mineralization can occur as both refractory and non-refractory styles. Refractory mineralization is characterized by early stage disseminated sulphides of primarily pyrite and/or arsenopyrite, hosting significant gold content, which is overprinted by late-stage quartz veining with minor amounts of visible gold and accessory polymetallic sulphides. Non-refractory mineralization is described as gold not hosted within sulphide minerals, in either the early or later stage-mineralizing event. Extensive oxidation has occurred and in some areas has liberated some of the refractory gold.

Extensive exploration has been conducted at the Project by various operators in the past. Red Back Mining Inc. (Red Back) (now Kinross) had consolidated the land package and had successfully compiled most of the historic data available. Besides sporadic small-scale mines that operated in the past, there is no history of mining operations in the Project area.

Widespread soil sampling and other regional-scale exploration techniques have been used in the past. Extensive trenching, rotary air blast, reverse circulation and diamond drill programs have delineated at least 14 gold prospects of which 3 contain the Inferred Resource.

The Project database is up-to-date and includes the results of the 2011 drilling and trenching programs. The borehole database has been validated against the original drill logs and assay certificates. As a result, WSP is of the opinion that using all the diamond drilling, reverse circulation, and trenches is appropriate for any resource estimate.

All the procedures implemented by previous operators, in regard to core-logging, sample collection, sample analysis, and quality assurance/quality control (QA/QC) meet industry standards. The data quality supports the resources estimate. The resource estimate update was completed on the Boin, Nyamebekyere, and Sewum zones using the ordinary kriging (OK) methodology on a capped and composited borehole dataset consistent with industry standards. Validation of the results was conducted through the use of visual inspection, swath plots, and global statistical comparison of the model against an inverse distance squared (ID^2) and nearest neighbour (NN) models.

Table 1.2 summarizes the results of the Inferred Resource estimation (unconstrained).

Table 1.2 Enchi Resource Summary

Category	Cut-Off (g/t)	Zone	Tonnes	Grade Au (g/t)	Contained Au (ounces)
Inferred	0.5	Boin	15,872,000	0.96	489,892
Inferred	0.5	Nyamebekyere	5,350,000	0.96	165,129
Inferred	0.5	Sewum	16,135,000	0.82	423,676
Inferred	0.5	Total	37,357,000	0.90	1,078,697

1.3.2 OPEN PIT MINING

WSP reviewed the Project at the level of a PEA. WSP cautions that the mine plan in this study used Inferred Mineral Resources.

Under NI 43-101 Part 2, Section 2.3(3) and Companion Policy 43-101CP, Part 2 Section 2.3(3), the use of inferred mineral resources is allowed in a PEA in order to inform investors of the potential of the Property.

The proposed operation considered in this PEA includes several discrete open pits from within the Boin, Sewum, and Nyamebekyere deposit areas. The LOM plan delivers 24.7 M tonnes of heap leach feed at an overall grade of 0.91 g/t Au and at a strip ratio of 3.16. The mine life for the 3 Mt/y scenario is 8.7 years.

The LOM plan generates 78.0 M tonnes of waste rock. The waste rock will be stored in waste rock storage areas located in proximity to the open pits in order to minimize waste haulage cycle times. In subsequent planning, where possible, some waste rock will be placed in mined out pits to reduce disturbed areas and thus reducing closure costs and project footprint.

1.3.3 METALLURGY AND RECOVERY

Due to the lack of test work for direct heap leach amenability, only a conceptual design has been studied for the purpose of the PEA. The process facility for the Project has been designed to process oxide or saprolite mineralization from the Boin, Nyamebekyere, and Sewum zones. The process route selected is a conventional heap leaching facility. The heap leach pads and recovery plant will operate year-round while crushing, agglomeration, and stacking will be shut down during wet weather periods.

1.3.4 PROJECT INFRASTRUCTURE

The Project is located in a rural area between the village of Sewum and Alatakrom, 20 km south of Enchi; the majority of the infrastructure works will be greenfields. The Project site has limited existing infrastructure. The existing main gravel road, Elubo-Enchi Road, passes between the mine sites. There is a 33 kV electrical line available near the Property with a couple of options for connection routes depending on demand and capacity required, with the utility company deciding on the preferred set up.

The anticipated infrastructure for the Project includes: mine dry facilities, equipment maintenance workshop, refuelling facilities, explosive magazine, office administration facilities, assay laboratory, and warehouse facilities. As well, access roads, stockpiling areas, storm water handling facilities, water supply, power supply network, diesel generators, sewage treatment plant, and waste management facilities.

It has been assumed that no onsite accommodations will be provided. Accommodations for expatriate and some senior staff will be provided through rental houses in the nearby town of Enchi.

1.3.5 ENVIRONMENTAL STUDIES, PERMITTING, AND SOCIAL IMPACTS

The most significant environmental and social issues are expected to be related to water management, social-economic impacts, and post mine-closure expectations. These issues are likely to either be of key concern to local communities and / or likely to have cost implications in respect of impact management during the operational and closure phases.

The Project will trigger a range of regulatory requirements and processes, which will require the application for, receipt of, and compliance with a variety of environmental permits and approvals from the relevant Ghanaian authorities.

Closure objectives should be defined early in the mine planning process and integrated into all activities throughout the LOM.

1.3.6 CAPITAL AND OPERATION COSTS

1.3.6.1 CAPITAL COSTS

The Owner Operated option scenario resulted in initial capital costs estimated at US$ 84 million, including US$ 14 million for indirect costs such as Engineering, Procurement, Project Management (EPCM) fees and construction indirect costs, and US$ 12 million in contingencies. Direct capital costs include cost for mine preparation, processing infrastructures, and site infrastructures. Sustaining capital is estimated to US$ 39 million, including US$ 7 million for indirect costs and US$ 5 million in contingencies. Sustaining costs also include a credit of US$ 15 million for salvage values.

Compared to the original Owner Operated scenario (WSP, 2015), the initial capital investment for the Contract Mining scenario is approximately 27% lower.

1.3.6.2 OPERATING COSTS

Operating costs for the entire LOM period for the Owner Operated option scenario is estimated to US$ 382 million. Cash costs are estimated to US$ 432 million for LOM period and include operation costs, royalties, and refining charges.

Compared to the original Owner Operated scenario (WSP, 2015), the cash cost of the Contract Mining scenario is approximately 20% higher.

2 INTRODUCTION

The Project is a shear-hosted gold bearing system located in southwestern Ghana within the Birimian aged rocks of the Sefwi volcanics and Kumasi sediments. The region is well known as a prolific gold producing camp, hosting numerous historical and current operating mines along strike to the northeast.

On December 5, 2014 Pinecrest announced that it had completed the acquisition of a 100% interest in the Project from Edgewater Exploration Ltd. and Red Back Mining Ghana Limited, an indirect wholly-owned subsidiary of Kinross Gold Corporation.

In March 2015, WSP completed a preliminary economic assessment (PEA) and technical report on the Property. The object of the report was to:

- Prepare a technical report on the Project in accordance with NI 43-101 that provides an indication of the Project's economic viability.
- Provide a restatement of the mineral resource on the Property.
- Provide recommendations and budget for additional work on the Property.

In May 2015, WSP was commissioned by Pinecrest to provide an updated PEA on the Property. This report has been prepared in accordance with NI 43-101, Form 43-101F1 and Companion Policy 43-101CP. The object of the report is to provide an additional alternative economic analysis of the Project using Contract Mining.

All data reviewed for the report was provided by Pinecrest in digital format, with access to paper reports and logs when requested. The work completed by Edgewater encompasses exploration, primarily surface trenching, reverse circulation drilling, and diamond drilling. Historical work conducted in the region has been compiled by Edgewater and was available for review and use in the resource estimation.

The Nyamebekyere and Sewum resources were updated with the 2012 Reverse Circulation (RC) drilling for the 2014 resource update. The Boin resource was not updated at the time, as no additional work has been completed on the deposit since the last technical report.

One of co-authors and qualified persons (QP) of this report is Mr. Todd McCracken, P.Geo., a professional geologist with 23 years of experience in exploration and operations, including several years working in shear hosted lode gold deposits and 10 years completing resource estimation and block models. Mr. McCracken visited the Property for three days from April 28, 2014 to May 1, 2014. This was Mr. McCracken's third visit to the Property, having visited previously in 2011 and 2010. During the most recent trip, Mr. McCracken was accompanied by Mr. Vincent Dzorkpetey, a geologist with Edgewater.

One of co-authors and a qualified person (QP) of this report, Ms. Joanne Robinson, P.Eng., a professional engineer with 18 years of experience in mine operations and consulting engineering, visited the Property on September 23, 2014. During the trip, Ms. Robinson was accompanied by Mr. Daniel Wilson, Country Manager with Pinecrest.

WSP considers the site visit current, per Section 6.2 of NI 43-101CP, on the basis that the material work completed on the Property was reviewed during the site visit and all practices and procedures documented were adhered to.

3 RELIANCE ON OTHER EXPERTS

WSP has reviewed and analysed data and reports provided by Pinecrest, together with publicly available data, drawing its own conclusions augmented by direct field examination.

WSP is not qualified to provide extensive comment on legal issues, including status of tenure associated with the Property referred to in this report. A description of the Property and ownership found in Section 4.0 was provided by Pinecrest and was sourced from the Government of Ghana. The information is provided for general understanding only.

→ Todd McCracken, P. Geo., relied upon Ryan King, President of Pinecrest for information pertaining to mineral claims and mining leases as well as the acquisition agreement as disclosed in Section 4.0 including royalties as disclosed in Section 22.

→ Jean Sébastien Houle, Eng. relied upon the following experts:

- Hilary Konigkramer, Director at WSP Environment & Energy South Africa to provide environmental screening and permitting process as disclosed in Section 20.
- Jean Gauthier, Partner, Taxation at Raymond Chabot Grant Thornton to provide post-tax analysis in Section 22. Mr. Gauthier is a Chartered Professional Accountant.

This report includes technical information which required subsequent calculations to derive subtotals, totals, and weighted averages. Such calculations inherently involve a degree of rounding and consequently introduce a margin of error. Where these occur, the QP does not consider them to be material.

4 PROPERTY DESCRIPTION AND LOCATION

4.1 LOCATION

The Project comprises ten prospecting licenses, totaling 696 km^2 located in the Enchi and Aowin Suaman Districts, in the southwestern region of Ghana.

The Project covers a 50 km strike length of the eastern margin of the Sefwi Belt stretching from the Côte d'Ivoire border in the southwest to the southern margin of the Suhuma Forest Reserve, to the northeast. The Project is located 290 km west of the capital of Accra and 70 km southwest of the Chirano Mine operated by Kinross (Figure 4.1). The Project is centered on 5°47’ North latitude and 2°42’ West longitude.

Figure 4.1 Location Map

4.2 MINERAL DISPOSITION

The ten licenses that make up the Project are summarized in Table 4.1 and displayed on Figure 4.2. Lease boundaries are defined by a list of latitude and longitude coordinates of the corners (pillar points) submitted to the Minerals Commission (Mincom). The boundaries are not physically marked on the ground and have not been surveyed by Pinecrest.

Yiwabra, Yankoman, Domeabra, and Ntejeso are license applications and are required to proceed through the full application process. These licenses were submitted between 2008 and 2009, prior to Pinecrest's involvement on the Property. The application process for a prospecting license, which is required for drilling and excavation work, is as follows:

- Application submitted to the Minerals Commission.
- Minerals Commission completes paper work and checks maps.
- Minerals Commission generates a letter that is sent to the local authorities and is posted for three weeks; this provides an opportunity for objections to the license application.
- Local authorities write back to the Minerals Commission if no objections are presented.
- Application proceeds to a technical committee.
- Upon technical committee approval, the license is prepared and sent to the Minister for signature.

The entire process typically takes two years or more to complete. Once an application is submitted, work in the license is allowed to proceed.

The renewal process is similar to the application process indicated above yet does not require approval of the district and community. The applications for renewal were submitted June 2012. The time frame for extending the licenses is variable depending on how busy Mincom is, and can take as little as six months to as long as two years.

During the renewal process, the licenses are not subject to a reduction in land size.

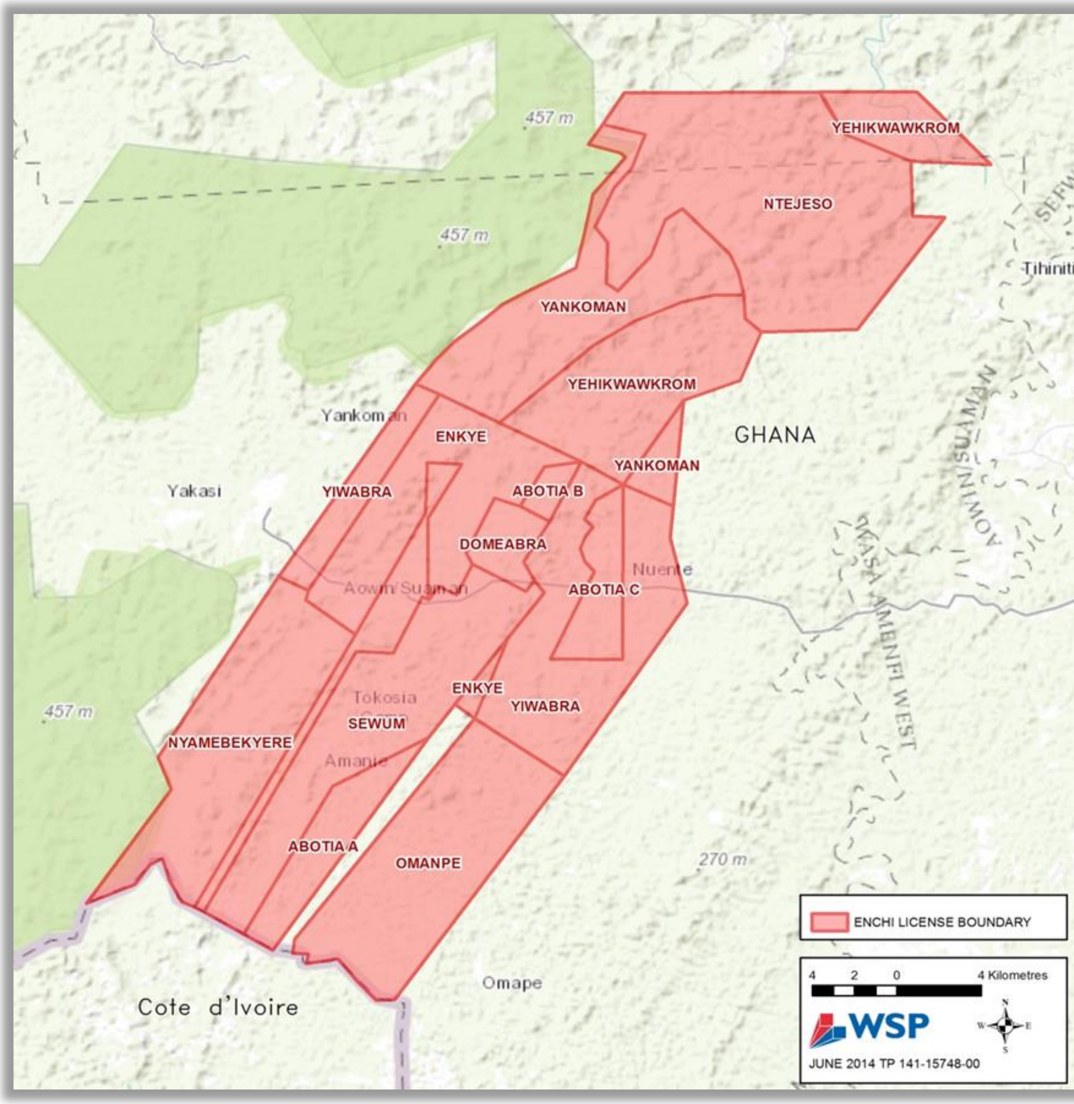
Despite the fact that most of the licenses have expired and renewal applications have been filed, the company still has legal access to the Property and has the sole right to conduct work on the Property. Only in the event of a rejection of the renewal application by Mincom, is the company required to stop work.

Table 4.1 List of Project Licenses

Name	Type	Number	Area (km)	Holding Company	Grant Date	Status	Action / Date
Sewum	PL	PL 2/424	68.79	RBMGL	30-Nov-08	Extension application made. Renewal granted 19 July 2013. Expired 19 July 2014.	EPA permit received. Renewal on July 20 2014. Application of Working Permit in progress.
Enkye (1, 2)	PL	PL 2/404	69.49	RBMGL	9-May-05	Extension granted 11 October 2012. Expired 11 October 2013. E. P. A. unable to grant permit on time due to loss of documents; Mincom notified of this development	EPA permit received. Application process for License Extension in progress.
Nyamebekyere	PL	PL 2/406	80.16	RBMGL	9-May-05	Renewal granted 16 January 2010. Extension granted 11 October 2012. Expired 11 October 2013. E. P. A. unable to grant permit on time due to loss of documents; Mincom notified of this development.	EPA permit received. Application process for License Extension in progress.
Abotia (A, B, C)	PL	PL 2/119	66.91	RBMGL	10-May-06	PL granted 31/12/09. Extension granted 11th October 2012. Expired 11 October 2013. E. P. A. unable to grant permit on time due to loss of documents; Mincom notified of this development.	EPA permit received. Application process for License Extension in progress.
Yehikwakrom	PL	PL 2/405	68.49	RBMGL	9-May-05	Renewal granted 16 January 2010. Extension granted 11 October 2012. E. P. A. unable to grant permit on time due to loss of documents; Mincom notified of this development.	EPA permit received. Application process for License Extension in progress.
Omanpe	PL	PL.2/436	67.92	RBMGL	25-Oct-11	Shed off area, new application. Approval letter received from Mincom. PL granted 24 October 2011. Renewal granted 23 April 2014. Expiring 23 April 2015.	Extension granted to be renewed on April 25, 2015. Application for EPA and Working Permit in progress.
Yankoman	PL	Not assigned yet	67.7	RBMGL	Not yet granted	Shed off area, new application. Awaiting response from Mincom with Minister.	Awaiting response from Mincom

Name	Type	Number	Area (km)	Holding Company	Grant Date	Status	Action / Date
Yiwabra	PL	Not assigned yet	68.43	RBMGL	Not yet granted	Shed off area, new application. Awaiting response from Mincom with Minister	Awaiting response from Mincom
Domeabra	PL	Not assigned yet	10.37	RBMGL	Not yet granted	Reviewed by the Technical Committee. Application referred to WRC. Mincom has taken up the issue with WRC for further discussion.	Awaiting response from Mincom
Ntejeso	PL	Not assigned yet	128.07	RBMGL	Not yet granted	Conversion from Enchi RL. Forest Reserve. Mincom aiding RBMGL to obtain permit. Forestry Commission is unwilling to grant forest entry permit.	Awaiting response from Mincom

Figure 4.2 Enchi License Map



4.3 TENURE RIGHTS

Edgewater has executed a definitive Option Agreement dated May 5, 2010 that outlines the terms of an Option-Joint Venture agreement with Red Back, whereby Edgewater can earn a 51% interest in Red Back's ownership interest in the Project. Red Back, through its subsidiary Red Back Mining Ghana Ltd, owns and controls 90% interest in the prospecting and reconnaissance licenses that make up the Project. The Government of Ghana owns the remaining 10% interest.

In order to earn the 51% interest, Edgewater must spend a total of CAN$5.0 million on work expenditures on the Project within 26 months, including CAN$2.0 million in the first 14 months. Edgewater will be the operator of the Option-Joint Venture agreement, and would continue to be the operator of the Joint Venture as long as Edgewater holds the largest equity interest in the Joint Venture.

On September 17, 2010, Kinross announced that it had successfully completed the transaction to acquire all outstanding shares of Red Back for CAN$7.1 billion, and that Red Back would become a wholly-owned subsidiary of Kinross.

On May 22, 2012, Edgewater announced that it had completed the earn-in requirements of the 2010 Option Agreement with Kinross. Edgewater now has a 51% interest in Kinross's ownership of the licenses and a joint venture company will be formed. The shares of the ownership of the joint venture company will be as follows:

- Edgewater 45.9%;
- Kinross 44.1%;
- Government of Ghana 10.0%.

On May 22, 2014, Pinecrest announced that it had entered into an agreement to earn 100% interest of the Project from Kinross and Edgewater. The Government of Ghana retains a 10% carried interest in the Project. The terms of the transaction are as follows.

For Pinecrest to acquire Kinross's 49% interest:

- Red Back will receive 19.9% of the issued and outstanding common shares of Pinecrest post-closing of the transaction.
- Red Back will receive a 2% NSR on the Project with an option for Pinecrest to acquire 1% of the NSR at any time for US$3.5 million. This option was transferred to Sandstorm Gold Ltd through another financing agreement.
- Red Back will receive $10/oz on any new NI 43-101 Measured and Indicated Resource Estimate or any ounce of gold mined whichever occurs first. Such amount shall be payable in cash or, if agreeable to Pinecrest, common shares of Pinecrest, at Pinecrest's sole discretion, provided that, Pinecrest shall not be entitled to elect to pay in common shares if such issuance would result in Red Back holding more than 20% of the issued and outstanding shares of Pinecrest.
- Red Back will have first right to process material from the Project at its Chirano Mill if toll processing is considered.
- Red Back will receive 5,000,000 share purchase warrants priced at $0.40/warrant exercisable for a five-year term from closing of the transaction.

For Pinecrest to acquire Edgewater's 51% interest,

- Upon closing of the transaction, Edgewater will receive one Pinecrest post-consolidated common share (the "Acquisition Shares") for every five common shares of Edgewater issued and outstanding on the closing, which will represent approximately 40% of the issued common shares of Pinecrest post-closing of the transaction. All shares issued to Edgewater will be subject to resale restrictions as follows: 25% to be free-trading six months and nine months from closing, and the remaining 50%, twelve months from closing.
- Edgewater will agree to distribute the Acquisition Shares pro-rata to its shareholders as soon as reasonably practicable after the closing of the transaction.
- Pinecrest will pay to Edgewater a cash payment of CAN$150,000.

→ The completion of the transactions contemplated by the Edgewater Letter of Intent (LOI) are subject to the execution of a definitive agreement with Pinecrest and the concurrent completion of the transactions contemplated by the Red Back LOI.

On December 5, 2014, Pinecrest announced that it had completed the acquisition of a 100% interest in the Enchi Gold Project from Edgewater Exploration Ltd. and Red Back Mining Ghana Limited, an indirect wholly-owned subsidiary of Kinross Gold Corporation.

4.4 ROYALTIES AND RELATED INFORMATION

There are no known royalties, back-in rights, or payments outside of the agreement between Pinecrest and Kinross. A 5% royalty on revenues is due to the Government of Ghana (Price Copper Waterhouse, 2012).

4.5 ENVIRONMENTAL LIABILITIES

WSP is not aware of any known environmental liabilities on the Property.

4.6 PERMITS

All required permits for conducting exploration on the licenses have been granted, or applied for and awaiting government approval.

4.7 OTHER RELEVANT FACTORS

The Company is able to work in areas with no existing surface properties free of fees. In areas where there is an established surface holder, the Company is required to pay compensation when properties are disturbed, in most cases this is related to the damage of crops during establishment of access of exploration activities.

The risk to the Project would come in the form of the licence applications being denied by Mincom and work having to be halted.

There are no other significant risks factors which could affect access, title, or the right or ability to perform work. The Company has completed successive and extensive exploration programs covering the majority of the licenses over the last five years.

5 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE, AND PHYSIOGRAPHY

5.1 SITE TOPOGRAPHY, ELEVATION, AND VEGETATION

The Project area is primarily drained by the Tano River and its tributaries, which flow generally in an easterly direction. Much of the Project area comprises steep topography incised by river tributaries with scattered flat plateaus with an average height of about 300 masl.

The majority of the Project area is covered by farmland. The main food crops grown locally are cocoa, plantain, maize, cocoyam, cassava, and rice (Figure 5.1).

Figure 5.1 Cocoa Plantation

The northern part of the Project lies within forest reserves, and is covered by tall, primary, semi-deciduous rain forest (Figure 5.2). Most of this area is reserved for commercial timber production.

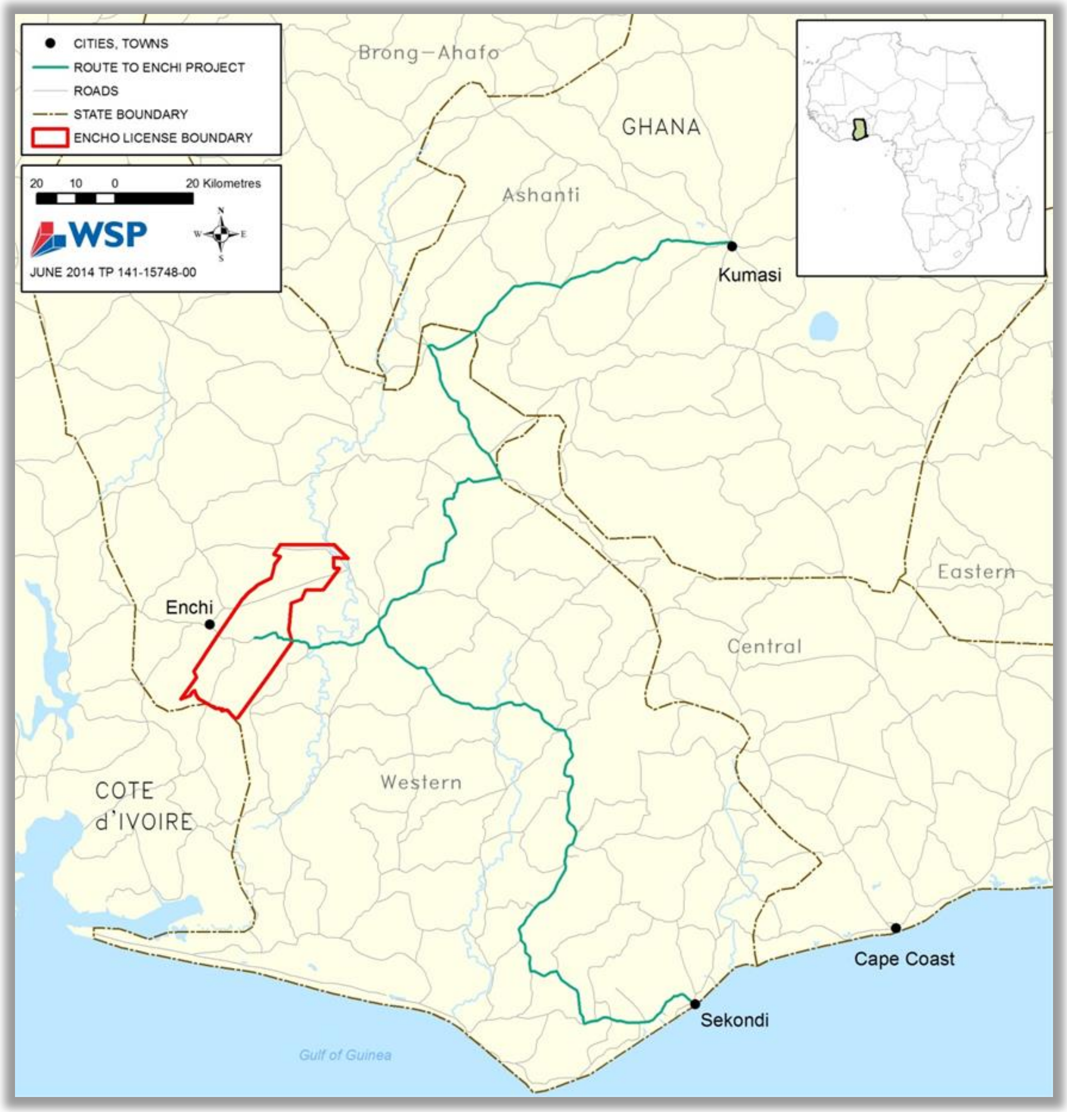
Figure 5.2 Forest Reserve

5.2 ACCESS

The Project is located in the southwestern Region of Ghana and is accessed from Accra on sealed roads via the regional port city of Takoradi or the mining centre of Tarkwa. From either of these centres, access to Enchi (population 9,270), the capital of Aowin-Suaman district, is available by paved and gravel roads (Elubo-Enchi Road or the Asankragua-Enchi Road). Access through the remainder of the Project area is by earthen roads (Figure 5.3).

Accra has daily international flights to and from Europe, the US, and various African locations. Domestic flight services are available with scheduled flights between Accra and Kumasi, which is located 170 km northeast of the Project. There is no known scheduled air service to the Project area.

Figure 5.3 Project Access Map



5.3 CLIMATE

The Aowin District, within which the project is based, is situated in the Wet Semi Equatorial Climatic Zone. The climate is typically warm and humid with a mean-monthly temperature of 27°C. There are two rainy seasons, the major rainy season from May to July, and a shorter rainy season from September to October. The district receives an annual rainfall of between 1,500 and 1,800 mm. During the dry season, predominately December to March, Harmattan winds (dry hot continental fronts from the Sahara) blow over the country resulting in drier warm days and cool nights.

Exploration and mining operation can be conducted on the Project year-round if required.

5.4 INFRASTRUCTURE

The entire Project area has limited to moderate infrastructure. The district capital of Enchi is located 77 km north of the substation at Elubo, serviced by a 225 kV line, and 122 km southwest of the substation at Asawinso, serviced by a 161 kV line. The Chirano Gold Mine, located 70 km northeast of the Project, is supplied by power from a 33 kV overhead power line from an existing transformer supplying the Bibiani gold mine plant. In addition, six diesel generators are located at the Chirano facility to provide stand-by power in case of Electricity Commission of Ghana (ECG) supply issues.

Fuel, accommodations, food, and most supplies can be obtained in the town of Enchi. Potable water must either be trucked into the area or supplied through water wells. The region has a long history of mining, and there is a large population base of skilled and unskilled labour to draw upon during the exploration programs.

Modern seaports at Takoradi and Tema are located 207 km and 447 km southeast of the Project respectively and have been used for the implementation and construction of several gold mines in recent years.

6 HISTORY

The exploration activities in the entire Project area date back to colonial times, with activities completed sporadically and by various individuals and companies.

Alluvial and reef gold were prospected and exploited by several generations of galamsey (local artisanal gold miner) workings to the present day. European companies explored, developed, and mined in several phases since 1900. The result is that erratic gold in vein quartz mineralization was "opened up" in a large number of pits, shafts, and drives, notably at the Sewum, Tokosea, Alatakrom, Achimfu, Nkwanta, and Kojina Hill prospects. Only the colonial Sewum and Tokosea mines appear to have any significant development and production history although this is poorly recorded. The limited mining activity ceased in the 1940s.

Table 6.1 summarizes the exploration activities that have taken place within the boundaries of the Project as currently held by Pinecrest. Due to the scattered nature of the work and the various license holders, WSP cautions that the history may not be complete. The majority of the information was derived from reports and digital data acquired from Leo Shield Exploration Ghana NL (Leo Shield), Mutual Ghana Ltd (Mutual), and Kinross.

The extensive work completed by the previous landholders has resulted in the identification of at least 13 gold-bearing prospects. A summary of the results for each prospect is provided in Section 7.0.

Table 6.1 Enchi Project History

Year	Company	Activities
1987	EQ Resources	2,837 soil samples on a 100 m x 25 m spaced grid.
1993	Mt. Edon	3,260 soil samples on 6 km by 3 km, followed by a 100 m x 25 m grid spacing; 250 rock chip and float samples.
1994-1997	Mutual	Spot imagery; Helicopter magnetic and electromagnetics on 100 m spaced lines; Fix wing magnetic and radiometric on 200 m spaced lines; 2,837 soil samples on 100 m by 25 m grid spacing; 2,257 soil samples on 200 m x 40 m grid spacing; 34 trenches totaling 2,396 m; Six diamond drillholes totaling 464 m; RC drill program totaling 1,202 m.
1995-1998	Leo Shield	14,470 soil samples in 400 m by 50 m grid; 89 trenches totaling 10,240 m; Audit sampling at Kojina Hill and Achimfu; Stream sediment sampling (76 pit); 121 RC holes totaling 7,621 m; 49 RAB holes totaling 2,028 m.
2003	Red Back	Assess historical data.

Year	Company	Activities
2004	Red Back	237 regional stream sediment samples; 16,728 soil samples; 148 rock chip samples.
2005	Red Back	695 soil samples; 69 trenches totaling 5,750 m; 102 RAB holes totaling 5,261 m; 80 RC holes totaling 9,715 m.
2006	Red Back	Ground magnetic survey; IP survey; 2,221 soil samples; 38 trenches totaling 3,564 m; 217 RAB holes totaling 7,182 m; 73 RC holes totaling 7,403 m.
2011	Edgewater	9,441 soil samples over 461 line kilometres; Twelve trenches at Nyamebekyere totaling 396 m; Three trenches at Sewum totaling 781 m; Eight trenches at Boin totaling 359 m; Seven trenches at Eradi totaling 1,294 m; VTEM/magnetic/radiometric survey totaling 3,084 line km; 180 diamond drillholes and 13 RC holes totaling 23,697 m; Resource estimation completed on Boin, Sewum and Nyamebekyere; results summarized in Section 14.11 of this technical report.
2012	Edgewater	Completion of 25 RC holes totaling 4,058 m; Bottle roll tests; Soil and rock sampling, auger drilling, and trenching.
2014	Pinecrest	Completes acquisition of the Project from Edgewater and Kinross.

7 GEOLOGICAL SETTING AND MINERALIZATION

7.1 REGIONAL GEOLOGY

The Enchi concession is located within southwest Ghana and straddles the boundary between the Sefwi Volcanic Belt to the west and the Kumasi Sedimentary Basin to the east. The Safwi and Kumasi are comprised predominantly of Birimian-age rocks (2.17 to 2.18 Ga) (Davis et al. 1994) (Figure 7.1).

The Sefwi Belt is dominated by mafic volcanics, metasediments, and intrusive granitoids that are sandwiched between sedimentary basins (Sunyani Basin to the west and the Kumasi Basin to the east). The Safwi Belt is traceable for hundreds of kilometres along strike, but is usually only 20 to 60 km wide. The metavolcanic and metasedimentary sequences are believed to be contemporaneous, with the sediment deposited in basins eroded from the adjacent volcanic terrains (Asiedu et al. 2004).

The Kumasi Basin is characterised by wide sequences of marine clastic sediments (quartzite, conglomerates, and phyllites). Both the Birimian sediments and volcanics have been extensively metamorphosed to greenschist facies, locally to amphibolite facies. The boundary between the volcanic belts and basins can be gradational, but is typically faulted with the faults most likely representing basin margin growth faults along which basin subsidence occurred (Hirdes and Leube 1989).

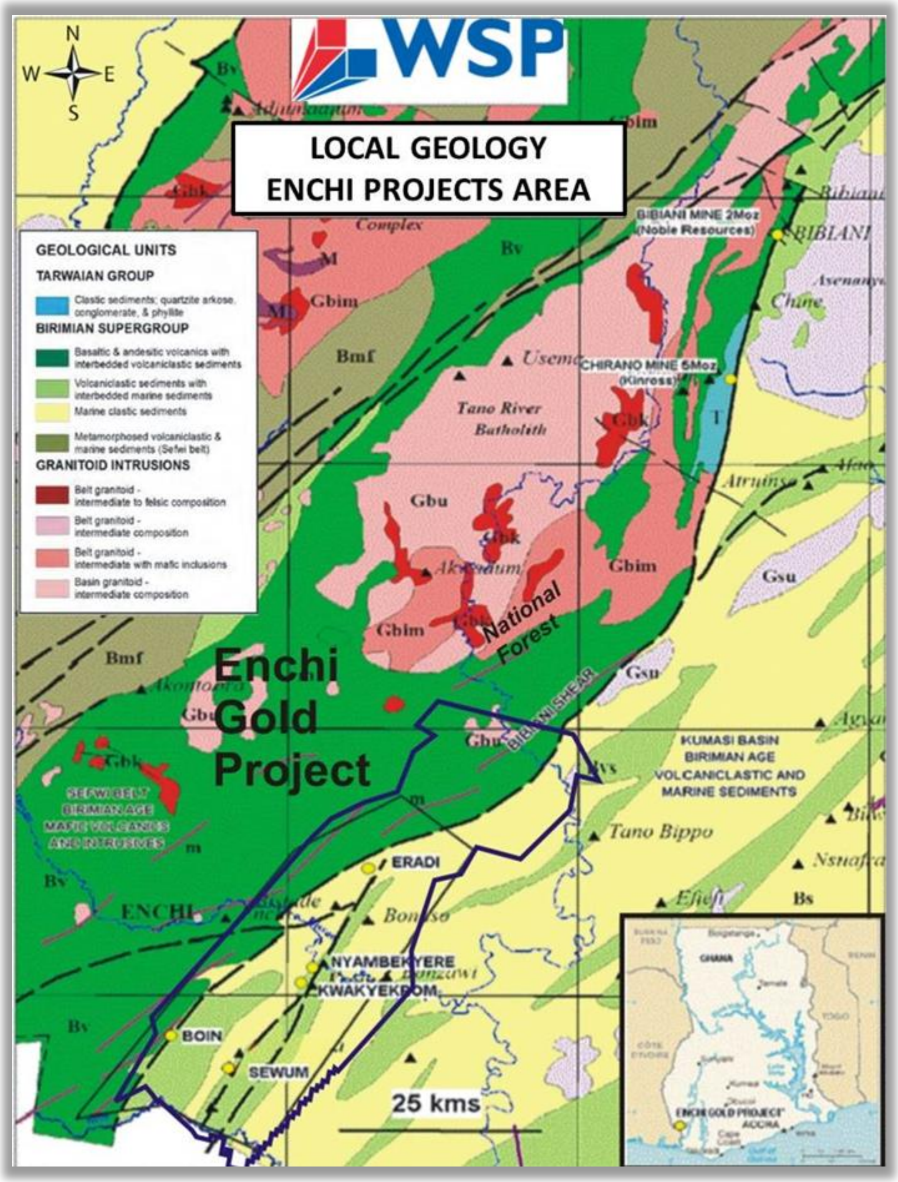
Granitoid intrusions are common within the belt and basin terrains and can be divided into two types: Belt Type (Dixcove) and Basin Type (Cape Coast) granitoids. Belt type granitoids (2,180 Ma) range from tonalite to granodiorite in composition and are confined to the metavolcanic belts. Basin granitoids (approximately 2,116 to 2,088 Ma) are mainly granodiorite in character and contain more potassium and rubidium relative to the belt granitoids and are concentrated in the central portions of the Birimian metasedimentary basins (Hirdes and Leube 1989).

Extensive faulting occurs along the margins of the volcanic-sediments belts. Observed at local and regional scales, these northeast-trending structures are fundamentally important in the development of gold deposits for the region. The major shear system within the Enchi concession at the boundary of the Sefwi Belt and Kumasi Basin is termed the Bibiani Shear Zone. Gold deposits are located in third-order structures that splay off the second-order structures and sub-parallel to the overall trend of the Bibiani Shear Zone. The Bibiani Shear Zone has been traced for 40 km on the Project area. Major structures within the concession are named from west to east, the Bibiani Shear (BS), the West Sewum Shear (WSS), and the Nyamebekyere Shear (NS).

The Obuasi-Enchi lineament, a major east-west crustal scale feature deflects the Bibiani Shear Zone at the north end of the Property in the vicinity of the Eradi gold prospect. This lineament is associated with the major Ashanti and Akyem gold deposits in the Ashanti Belt, 100 to 200 km to the east.

Multiple tectonic events have affected virtually all Birimian rocks. The dominant event is compressional folding and thrusting from the Eburnean Orogeny (2.1 to 2.2 Ga) (Schofield 2006; Eisenlohr 1989).

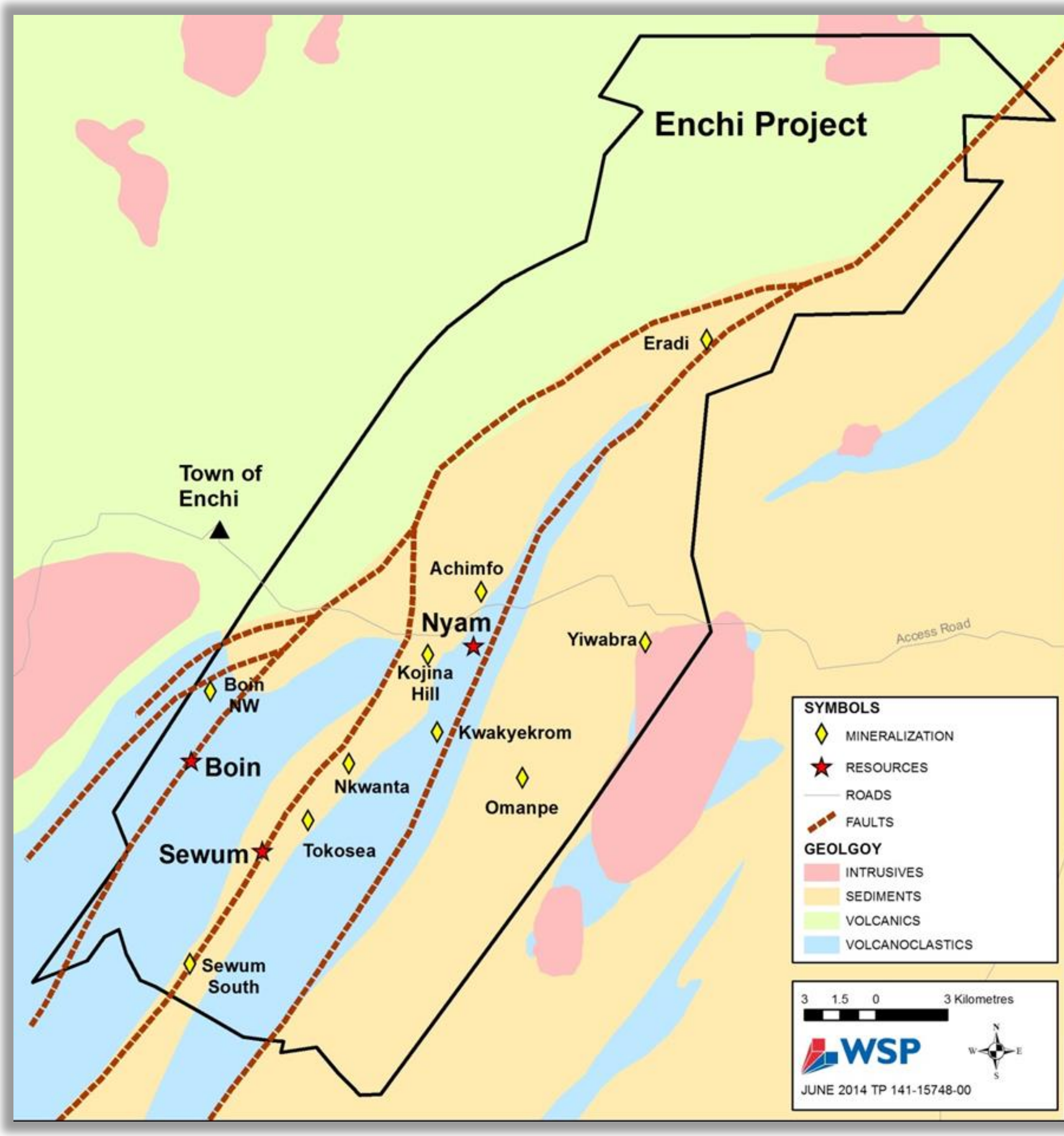
Figure 7.1 Regional Geology



7.2 PROJECT GEOLOGY

The Project overlaps 40 km of the belt-basin contact on the east side of the Sefwi Volcanic Belt north of the Côte d'Ivoire border. The contact is marked by a major fault known as the Bibiani Shear Zone which also hosts the Chirano and Bibiani Gold mines located 70 km north of the Enchi licenses (Figure 7.2).

Figure 7.2 Project Geology



The Project is characterized by variably degraded laterite to residual soil profiles with minor caps of indurated ferro-duricrust across the main hilltops. Rock outcrops are rare due to the thick tropical weathering and jungle cover. Most rock exposures are found in road cuttings and by trenching.

Numerous other major faults splay off the Bibiani Shear Zone pass through the license area, e.g. Boin Fault, Sewum Fault, and Nyamebekyere Fault. Many gold deposits in the Enchi district are localized along or adjacent to these structures.

The regional scale shears are believed to have been originally formed as thrusts during northwest-southeast compression with later movements dominated by left lateral strike slip shearing (Griffis 2002).

The principal rock types found on the Project are defined below.

- → Volcanics (MB): massive, very fine-grained, textureless, weathered white to brown, to deep pink and red, igneous rock generally evident as un-deformed rafts, fault-bound, within foliated and sheared volcaniclastics and pelitic sediments.
- → Volcaniclastics (SVC): hanging wall, fine- to medium-grained, lithic to crystal volcaniclastic wacke, with a characteristic porous, spongy, honeycombed texture. It weathers to light pink and is variably graphitised and foliated to sheared, proximal to the late faults.
- → Turbidites (SPH): footwall, metre-thick, cyclically bedded, turbidite sequence of graded, fine- to medium-grained, grey to black, phyllitic pelite-psammite beds. The finer pelite horizons are more preferentially strained and the coarser units are more preferentially fractured.
- → Graphitic Phyllites (SPG): black, very fine- to fine-grained carbonaceous and graphitically altered phyllites and schists. Each of the host rock-types may be preferentially graphitized ±silicified and sheared proximal to the reactivating faults and shears, becoming increasingly assimilated to SPG. Within and proximal to the main SPG deformation zones, texture was the main discriminating feature used to distinguish and map the SVC-SPH contact.
- → Quartz Veins (QV): massive 0.5 to 5 m wide, white to smoky, blue polyphase quartz veins variably faulted and graphitized and mineralized. The major quartz zones represent the main hanging wall deformation zone developed as a result of the progressive movement along the basal contact shear zone.
- → Basic, Intermediate and Felsic Dykes and Sills: coarse grained granodiorite to diorite and finer grained equivalent andesites to dolerites have been logged. The felsic and intermediate dykes tend to be layered parallel, altered and structurally deformed within the surrounding host volcanics and sediments. The dolerites are generally much later, crosscutting. They were traditionally mapped as post-deformational, though they are often crosscut and displaced by late reactivation. There is evidence for multiple generations of dolerites through to post-Cretaceous times.

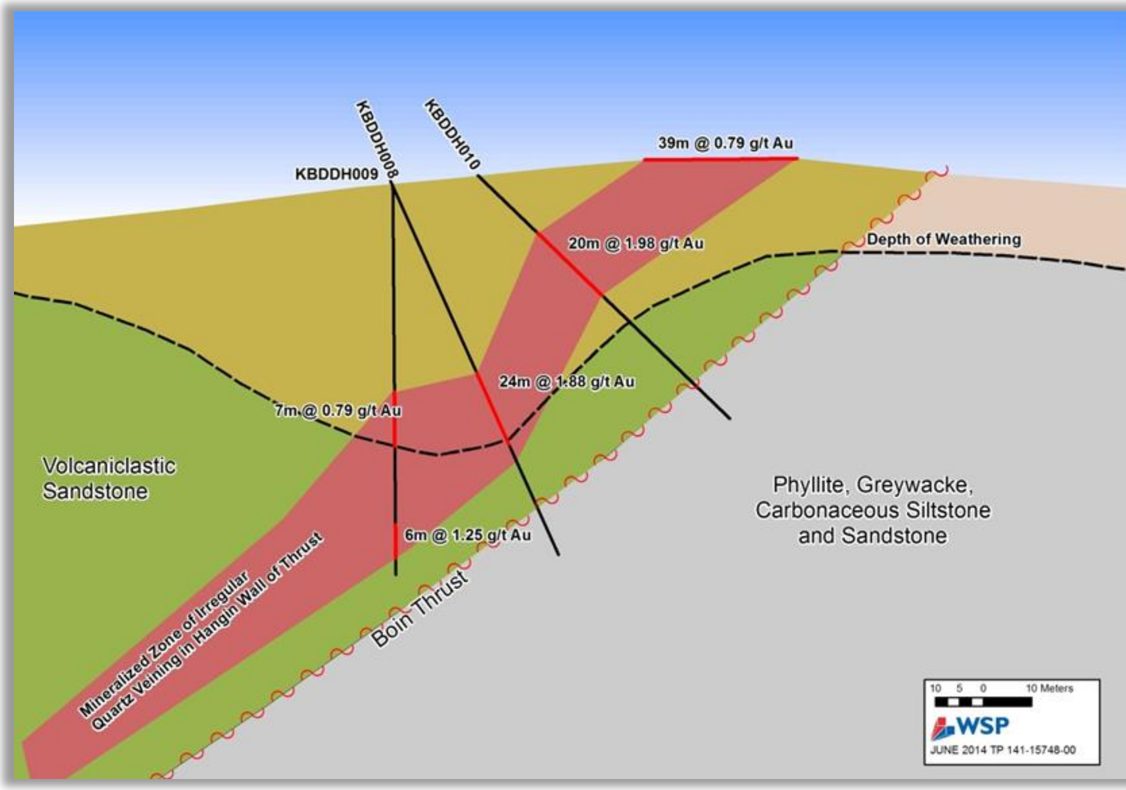
7.3 MINERALIZATION

Thirteen gold zones or prospects have been identified on the Project to date. The locations of the zones are illustrated on Figure 7.2.

7.3.1 BOIN ZONE

The Boin Shear Zone is one of a number of major structures that splay off the BS and pass through the Project. The Boin Shear Zone is interpreted as a thrust fault, dipping moderately west and is responsible for the development of the zone of mineralized quartz veins at Boin. Eleven kilometres of the Boin Shear Zone has been drill tested at shallow depths over regular intervals across the structure. A generalized section is shown on Figure 7.3.

Figure 7.3 Boin Generalized Section



The Boin Shear Zone is formed in the west hanging wall of this major second-order, west-dipping, thrust contact between mafic volcanic ±volcaniclastic sediments which over-thrust turbidites to the east. The whole contact is expressed as a 10 to 30 m wide graphitic shear zone, which trends 025 to 040° and dips west 30 to 70°. The Boin thrust is an early, regionally second-order splay or replication off the main basin-boundary contact further to the west. Multiple sets of crosscutting fabrics, veins, and faults have been recorded within the core and trench logging. The gold is mostly found in the hanging wall quartz zone and is characterized by massive 20 to 30 m wide zones of intensive quartz veining cut and fractured by late, graphitic faults.

There are multiple generations of pyrite developed within the Boin structures. The early, barren, non-auriferous pyrite tends to be intense, well-formed, coarse, and cubic. The later, possibly re-mobilized, auriferous pyrite tends to form as fine to very fine, disseminated cubic crystals within graphitic fault margins, or amorphous ribbons, rims or coatings within quartz veins.

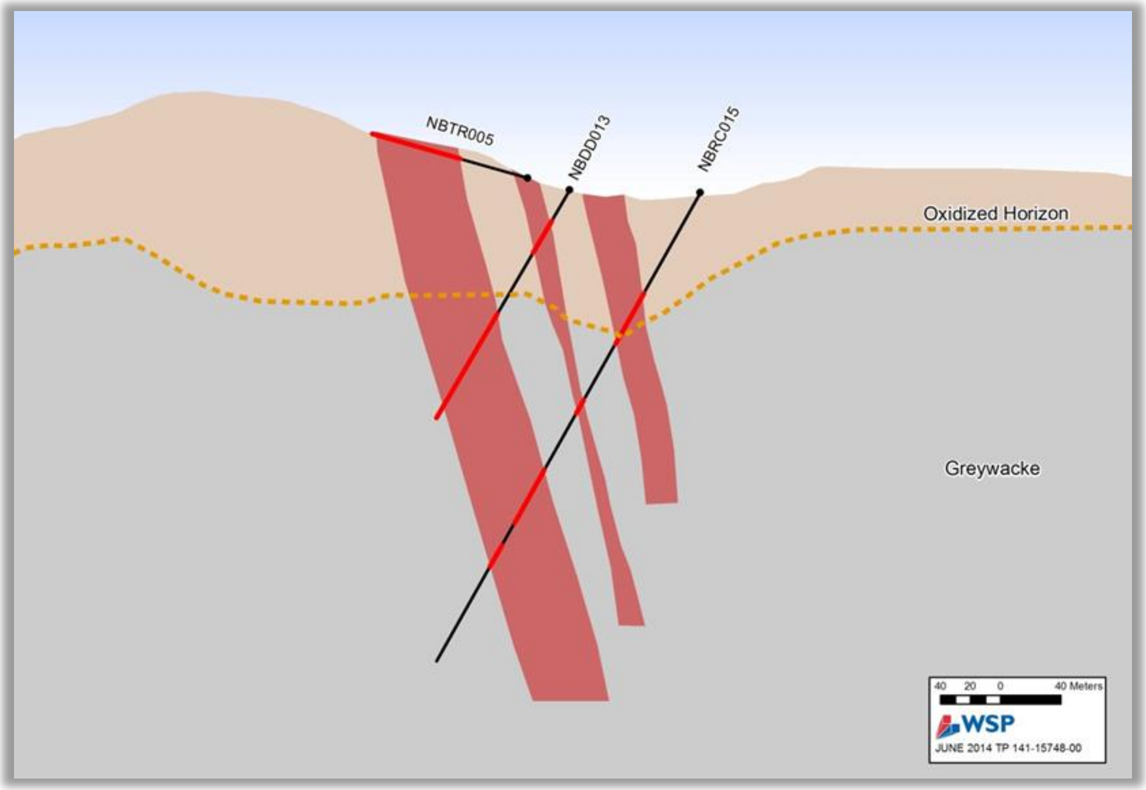
Hydrothermal alteration displays a typical greenschist assemblage (gold + quartz + sericite ±graphite ±chlorite ±epidote ±ankerite). Chlorite + epidote clots are observed within, or proximal to, the gold mineralization within the brecciated quartz veins. These probably result from remobilization associated with regional alteration.

No visible bleaching or other styles of alteration have been observed in the host sediment related to the quartz veining apart from narrow silicified vein selvedges. At the Boin Zone, the depth of intense weathering is up to 100 m in places. Weathering is deepest where the mineralization is best developed suggesting the greater intensity of veining and fracturing may have enhanced the weathering over the deposit.

7.3.2 NYAMEBEKYERE ZONE

The Nyamebekyere Zone strikes over a distance of 1,600 m, hosted by altered phyllite, 200 to 300 m west of the interpreted position of the second order NS. The zone of mineralization lies in the hanging wall of a northeast-striking shear that dips 70º east and is up to 30 m thick. Nyamebekyere mineralization is part of a continuous 15 km strike length of gold prospects on the Project from Nyamebekyere southwest through Kojina Hill to Sewum in the south. An extensive envelope of weak gold mineralization (more than 0.25 g/t) dips sub-vertically and strikes 030° (Figure 7.4).

Figure 7.4 Nyamebekyere Generalized Section



Mineralization at the Nyamebekyere Zone is composed of veined and brecciated sediment and phyllite cemented by quartz, carbonate (ankerite), and albite and has been traced continuously in trenching and drilling for over 2,000 m along strike.

Alteration associated with the zone of veining and brecciation consists of bleaching due to replacement by sericite, quartz, ankerite, albite, rutile, and minor pyrite. Pyrite typically makes up less than 1% of the infill and alteration minerals. No visible gold or arsenopyrite or base metal sulphides have been identified in any core samples to date.

The footwall of the mineralization is marked by carbonaceous shears and a 2 to 3 m wide zone of green coloured fuchsite-magnesium chlorite alteration. The fuchsite is believed to represent an alteration front where chromium leached from the altered volcaniclastic sandstone beds and has been re-deposited in micas, replacing the basal shear adjacent to the quartz-carbonate-sericite alteration zone.

The zone of quartz-sericite-carbonate bleaching has a gradational upper contact and is not always mineralized. Carbonaceous shears cut through the mineralization indicating that the shear zone has continued to move after the mineralization event. Post mineralization deformation is also supported by petrologic studies that describe stylolites, recrystallization, strained and sutured quartz, and albite grains in the vein material (England 2011).

Rare sphalerite and anhedral grains of chalcopyrite less than 0.1 mm in size, rimmed by tetrahedrite – tennantite have been observed in the quartz veins during petrological studies (England 2011).

7.3.3 SEWUM GOLD PROSPECTS GEOLOGY

The Sewum West and South Prospects are found along the eastern contact of a thrust-bounded volcanic sliver, outcropping 6 km to the east of the Boin Zone on the NS. The gold mineralization is associated with late D2 to D4 deformation phases. It is structurally controlled within, and adjacent to, late graphitic faults focused on the margins of poly-phase quartz veins within faults. The veins developed along the axial planes of hinges and limbs of earlier hanging wall D3 drag folds ± intrusives.

The Sewum Gold Prospects form a continuous 40 km strike length of prospects from Sewum Hill northeast through Kojina Hill and Nyamebekyere Zone to the north.

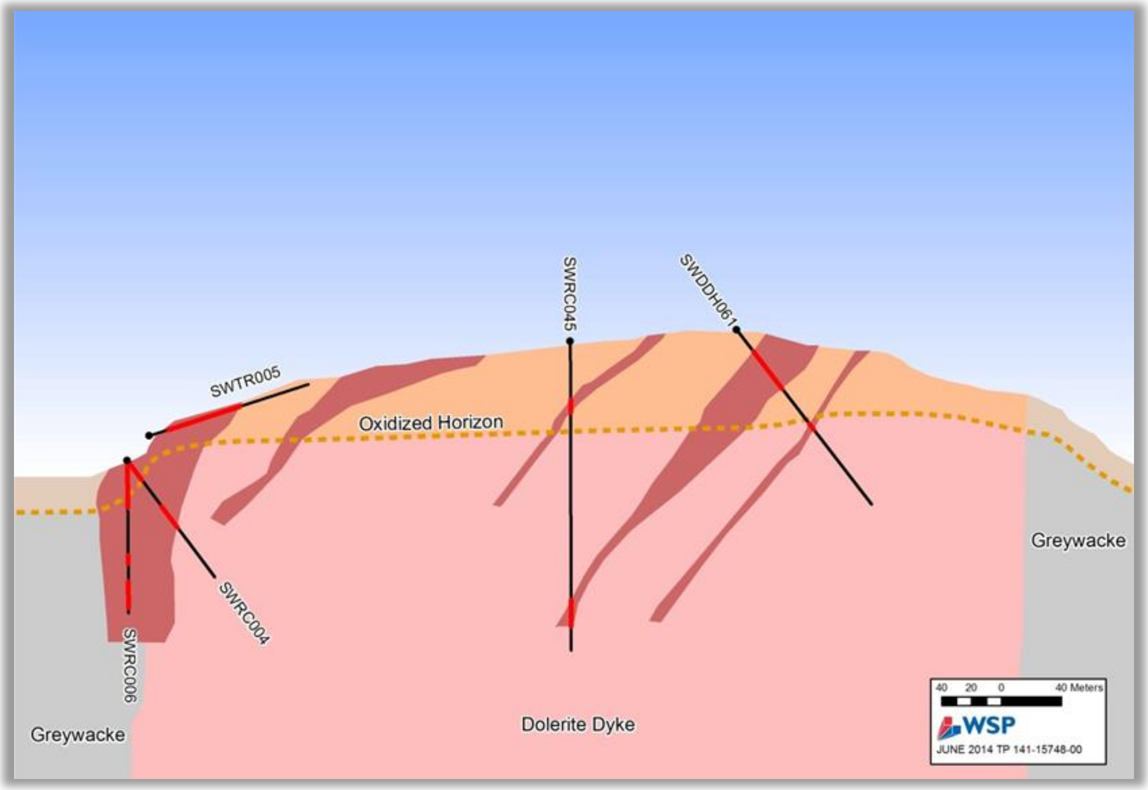
The main relief of Sewum West Hill is characterized by a relict indurated, duricrust, or ferricrete plateau along the main hilltop, degraded breakaways forming the slope crests and variably mixed and transported upper-slope soils progressing into residual mid- and lower-slope soils. The duricrust mantle is geochemically subdued and potentially transported ferricrete. Various surrounding hilltops have similar remnant duricrust caps and should be evaluated with care to understand and develop the regolith model for the region. Sewum West Hill has a very significant deep weathering profile.

The Sewum setting differs, however, in the scale of shear zones as compared to those expressed at Boin and has proportionally more igneous volcanic rocks and late-stage, intrusive intermediate and felsic dykes or sills.

The Sewum Prospects are situated along several major thrust zones that crop out across the regional 3 km wide north-south corridor, south of Tokosea. The structures comprise (west to east) (Figure 7.5):

- the Road Zone (SRZ);
- Hilltop Shears (SHS);
- Main Contact Zone (MCZ);
- Sewum West Zone (SWZ);
- Sewum-Tokosea Mine Trend (SETO).

Figure 7.5 Sewum Generalized Section



The host rocks at Sewum are dominated by interbedded carbonaceous siltstone and sandstone (turbidite). The sediments have been regionally deformed to greenschist facies, are steeply dipping, and typically strike north-northeast (30º) parallel to the regional structural grain. A steeply dipping dolerite dyke 3 km long and up to 500 m wide has been intersected in the drilling and acts as an important host to gold mineralization in the Sewum area.

Three styles of mineralization have been identified at Sewum:

- Disseminated arsenopyrite associated with quartz veining and silicification in sheared sediment, e.g. Sewum Shear Zone.
- Quartz – sericite – carbonate replacement of sheared dolerite and sediment localized along moderately (40°) dipping shears hosted within dolerite, e.g. Sewum Ridge Top Shears (SRTSZ).
- Brecciated and stockworked sediment and dolerite developed at the margin of the dolerite dyke and replaced and in-filled by quartz-sericite ankerite and minor sulphides, e.g. Checkerboard Hill, East Contact Zone (ECZ), and West Contact Zone (WCZ).

The Sewum Shear Zone represents a major regional structure that can be traced within Ghana for 25 km south from where the shear branches off the Bibiani Shear Zone and continues across the Ghana border into Côte d'Ivoire. The shear has a complex anastomosing geometry with numerous splays and has played a major role in localizing gold mineralization in the Sewum area, e.g. Adamansu, Sewum, and Tokosea goldmines currently operating small scale mines.

Striking north-northeast, the Sewum Shear is typically vertical to steep west dipping and can be up to 100 m wide. Mylonitic fabric has been observed within the shear zone in places. Gold mineralization within the Sewum Shear is related to a phase of quartz veining with associated arsenopyrite.

Mineralization is discontinuous and appears to be related to an early phase of quartz veining that has been brecciated by later movement along the Sewum Shear.

The dolerite dyke at Sewum has acted as a solid “node” with the bulk of the regional scale deformation absorbed by the surrounding host fine grained carbonaceous sediment. Branches of the Sewum Shear have anastomosed around the dolerite dyke and in places mark the contact.

The most significant zone of continuous gold mineralization identified in drilling at Sewum is the Ridge Top Shears Zone (RTSZ), related to moderately dipping shears up to 20 m thick hosted within the dolerite dyke.

The relationship of these shears with the Sewum Shear Zone is unclear but they are most likely temporally related. The shears within the dolerite may be thrust faults or faults that link between the steep shears that anastomose around the dolerite dyke.

The dolerite intrusive has not been faulted into place as along the dyke’s west margin features typical of intrusive contacts such as frictional “intrusive breccia”, hornfelsing of adjacent sediment and chilled margins within the intrusive have been observed. The age of the dolerite dyke is not certain however, the partially sheared east contact, spatial relationship with gold mineralization and some drill core features indicative of soft sediment deformation at the intrusive contact, indicates the intrusive was probably emplaced during the Eburnean Orogeny similar to most other mafic intrusives in the region. It is also possible the dyke may have been intruded as a sill along bedding planes and later tilted vertical during region deformation along with the host sediment.

The size and composition of the intrusive at Sewum is more akin to the “belt” style intrusives than the “basin” style intrusives which tend to be larger, coarser grained and felsic in composition (Griffis, et al. 2002).

The presence of the dolerite body within the Sewum Shear Zone is significant in that the intrusive represents a more competent rock type compared to the surrounding sediment and is more likely to deform in a brittle manner during faulting and deformation, potentially making a better (more permeable) host to mineralization similar to the Chirano Gold Mine (brecciated granite host).

Mineralized breccia and stockworking is commonly found along the margin of the dolerite dyke (ECZ and WCZ). The breccia is composed of angular clasts of siltstone and dolerite in a clast support fabric cemented by quartz, carbonate, and minor pyrite. The breccia texture indicates very little milling, and mixing of fragments has occurred and was formed by hydraulic fracturing, probably in response to fault movement near the intrusive contact.

7.3.4 ERADI

The Eradi Prospect is located in the north of the Enchi license area where the regional structures converge and gradually change strike from north-northeast to northeast. Very little outcrop exposure is present at Eradi due to the thick weathering profile and laterite development. All geology mapped comes from trenches and drillholes.

The Nyamebekyere Shear Zone (NSZ) is one of a number of major structures that splay off the Bibiani Shear and pass through the Enchi license area. Mineralization at Eradi is developed within a second order shear that parallels and lies 300 m west of the NSZ. Gold mineralization at Eradi is entirely hosted in quartz veins. The veins are very irregular in shape, size and orientation, rarely exceeding 1 m in thickness and tend to dip moderately (20 to 60°) east. The intensity of veining varies markedly between drill sections. Quartz in the veins is composed of white, less than 10 mm anhedral grains that are often fractured and recrystallized by later shearing. The quartz veins are generally quite pure, containing rare carbonate minerals and no sulphides.

No visible bleaching or other styles of alteration have been observed in the host sediment related to the quartz veining apart from narrow silicified vein selvedges. No intrusives have been identified in trenches or drill core at Eradi.

The host rocks at Eradi are dominated by interbedded carbonaceous siltstone and sandstone (turbidite). The sediments have been regionally deformed to greenschist facies, are steeply dipping, and typically strike northeast (040°) parallel to the regional structural grain. Gold mineralization at Eradi is hosted in irregular quartz veining localized along northeast striking shear zones with a near vertical dip.

7.3.5 ACHIMFU

Several thin (less than 1 m wide) quartz veined structures are hosted by phyllite exposed in old workings including small shafts and galamsey workings over strike-lengths of up to 400 m and depths of up to 40 m. Erratic high-grade gold is hosted by quartz veining. The vein hosting structures are considered steep southeast dipping thrusts that juxtaposed folded finer and coarser grained metasediments (carbonate altered siltstones, pyrite altered quartzite and greywacke).

7.3.6 ADAMANSU

Quartz veining is hosted by phyllite, within a contact zone, with volcaniclastics to the west. The contact zone is possibly the fault displaced strike extension of that at the Sewum mine, and the southern extension of that at the Tokosea Mine.

7.3.7 ALATAKROM

The Alatakrom Prospect is along strike, northeast of the Tokosea East Prospect. Several conformable sub-vertical gold mineralized quartz vein zones are hosted by phyllite, within 50 m of a contact with volcaniclastics to the west.

7.3.8 BEEKOKROM

The prospect straddles projected strike positions of mineralized structures defined at the Kwakyekrom Prospect, 2 km to the southeast.

7.3.9 KOJINA HILL

Mineralization is hosted by a zone of deeply weathered quartz-veined phyllite. Fuchsite altered greywacke is also noted. Mineralized zone dips west at 80° and plunges steeply to moderately north.

7.3.10 KWAKYEKROM

The Kwakyekrom Prospect is 4 km southwest of the Nyamebekyere Zone. Several shear hosted gold lodes strike northeast and dip steeply (70 to 80°) east within phyllite, 500 to 900 m west of the NS.

7.3.11 NKWANTA

An adit at the Nkwanta Prospect tests a weakly mineralized narrow quartz vein over a strike of 300 m. The quartz vein is hosted by phyllite, within a contact zone, with volcaniclastics to the west. The contact zone is possibly the strike extension of that in the Tokosea Mine 3 km to the south.

7.3.12 SEWUM MINE

The Sewum Mine developed two narrow (0.5 to 1 m wide) quartz veins, the Main Reef and West Reef, over a strike of 450 m. The veins dip southeast at 45 to 60° within a strongly deformed carbonaceous phyllite near a contact with less deformed volcaniclastics to the west. The Sewum Mine is possibly hosted by a bedding concordant splay from the second order splay.

From 1940 to 1951, the Kwahu Mining Co. deepened the main shaft to 120 m and developed the 45 m and 78 m levels. No production was recorded (Kesse 1985).

7.3.13 TOKOSEA MINE

The Tokosea Prospect is located on the same phyllite/volcaniclastic contact as that located west of the Sewum Mine, although offset by faulting south of Adamansu. The prospect includes the workings of the Tokosea Mine along with several parallel and en echelon gold mineralized quartz veined zones some 30 m to the east, including the Tokosea East Prospect. The mine has development on the 18 m, 27 m, and 45 m levels.

All the significant gold mineralization is hosted by sub-vertical quartz veined structures in phyllite with some gold in quartz veinlets within the volcaniclastic unit. The main structure developed in the Tokosea Mine is a shear hosted, thin (0.3 to 1 m) lenticular quartz vein, dipping 85° northwest, and following a contact between a dominantly argillaceous (phyllite) footwall (eastern) and a dominantly volcaniclastic hanging wall (western) unit. The immediate host rock is a black carbonaceous phyllite. The general strike is 030°.

7.3.14 TOKOSEA SOUTH

An adit intersected patchy gold (the best result was 1 m at 2.04 g/t) on a shear zone with quartz stringers and veins hosted by phyllite, within a contact zone, with volcaniclastics to the west. The contact zone is the strike extension of that in the Tokosea Mine, 800 m to the northeast.

8 DEPOSIT TYPES

The Project mineralized zones have the characteristics of epigenetic, mesothermal quartz vein style gold deposits with an overlying gold –bearing saprolite. This type of mineralization is the most important type of gold occurrence in West Africa, and is commonly referred to as the Ashanti-type.

Mesothermal mineralization has a strong structural control and brittle-ductile deformational style that is related to large tectonic corridors (more than 50 km long and several kilometres wide). These deformational zones display evidence of complex multi-phase displacement with mineralization typically associated with second and third order structures (Roberts 1988). Auriferous veins are best developed at dilatational sites where structural or compositional irregularities occur within the shear structure. Favourable sites include conjugate or branching shear zone intersections, major flexures within the shear plane and compositional variations associated with major lithological contacts or incorporated dyke material.

The most common host rock is usually a fine-grained metasediment in close proximity to graphitic or siliceous chemical sediments. However, in some areas, mafic volcanic and intrusive rocks are known to host significant gold mineralization as at Kinross' Chirano Gold Mine located 70 km north-east of the Project.

Mesothermal alteration is generally more visible within greenschist facies settings. Alteration usually occurs as chloritization, pyritization, silicification, and tourmalinization, with minor amounts of potassic and alkali feldspar alteration as well as potassic phyllosilicate (sericite, muscovite, and biotite) alteration. Carbonate alteration is pervasive (ankerite, and calcite) on regional- and deposit-scales (Vu, et al. 1987).

Mineralization can occur as both refractory and non-refractory styles. Refractory mineralization is characterized by early-stage, disseminated sulphides of primarily pyrite, and/or arsenopyrite hosting significant gold content, which is overprinted by late-stage quartz veining with minor amounts of visible gold and accessory polymetallic sulphides. Examples of the refractory-style deposits include Obuasi (AngloGold), and Boloso/Prestea (Golden Star Resources). Non-refractory ore is described as gold not hosted within sulphide minerals of either the early or late stage mineralization events. Examples of non-refractory mineralization include Chirano (Kinross), and Ahafo (Newmont).

The reserves and resources stated in the previous paragraph are not indicative of the mineralization on the Enchi Project. The reserves and resources stated in the previous paragraph have been disclosed only to show the potential of the Property based on existing or past producers in the regions.

The gold mineralization that occurs in the oxidized zone is released from the hypogene orebody by physical disaggregation and chemical dissolution. Dissolution and reprecipitation of gold in the saprolite, appears to take place in situ with little evidence of supergene enrichment. The mineralization can be concealed by metres of kaolinite-mica forest soils. The saprolite zone of leached rock can extend down 60-70 m (Bowell, 1992).

9 EXPLORATION

Exploration, consisting of line cutting, soil sampling, trenching, and auger drilling, was completed by Edgewater in 2012–2013. The principal targets were anomalies generated from the airborne geophysical surface. The work included both wide-spaced and detailed surveys. Results included anomalous gold in soils, trenches, and auger which warrant additional follow-up work.

The procedures for each of the exploration method were summaries from the “Geologist’s Procedures Manual, Version 1.0, October 1, 2005” generated by Red Back Mining (Red Back, 2005).

9.1 SOIL

All soil sampling was conducted in the presence of a geologist and was not carried out by technicians alone. Samples were collected from ±50 cm depth and were 2 to 3 kg of material. Duplicate samples were collected every 25 samples. To collect the duplicate, a larger hole had to be dug to collect 5 to 6 kg of sample and mixed thoroughly on a plastic sheet. The material was then coned and quartered into two samples. Table 9.1 summarizes the soil work completed.

Table 9.1 Soil Survey Summary

Prospect	Area Covered (km^2)	No. of Lines	Grid (spacing)	Total Line Length (km)	No. of Samples	Type of Sample
Yiwabra	56.00	57	400 m x 50 m 200 m x 50 m	108.8	4,722	Soil
Omanpe	52.00	33	400 m x 50 m	96.8	2,595	Soil
Enkye	35.00	10	400 m x 50 m	60.0	986	Soil

9.2 TRENCHING

The trenches were dug 80 cm to 100 cm wide with a maximum depth of 3.5 m.

The name of a trench consists of a two-letter prospect prefix, followed by “TR” and then a sequential numbering.

For consistency, trenches start at the western end (collar) and intervals are measured along the surface using slope distance, not horizontal distance. This allows correct plotting of the trench as a three-dimensional entity. To allow routine plotting of the trench as a drillhole, each segment must be considered to be a separate trench, with its own collar, and with its sample intervals starting at zero at its western end. The segments of a trench are identified by suffixes, for example CHTR798A, CHTR798B, from west to east.

Completed trenches are measured by marking out intervals along the surface starting from zero at the western end. Strings may be dropped down the sides of the trench to help the marking of the 1- or 2-metre sampling intervals near the base of the trench.

The trenches are surveyed as a three-dimensional entity, and trench data is stored in the standard drilling tables of the database (collar, survey, assay, geology). The collar coordinates are determined by tape and compass, GPS, DGPS, or EDM survey depending on the stage of the project.

The surface trace of the trench is surveyed from the collar to the end using tape, compass, and clinometer the produce a 'downhole' survey file. The intervals are chosen to match inflection points in the trench trace.

The 'from and to' measurements are slope measurements along the surface and are not corrected to horizontal distances.

The survey is usually done by a geologist and an assistant. The assistant holds a pole with a mark at the geologist's eye height. The geologist stands at the collar, the assistant at the first inflection point, and the geologist sights on the mark on the pole to record the inclination and azimuth.

Continuous channel samples are cut from the centre line of the floor of the trench. The trench must be checked by a geologist prior to sampling to ensure saprolite has been reached. The base of the trench must be cleaned by brushing or using a spade prior to sampling. Trenches are sampled by lithology, routinely using 2 m intervals with a minimum interval 0.5 m.

Duplicates were taken every 25 samples. This is a second channel cut either just above or just below the original sample.

Table 9.2 summarizes the work completed on the trenches.

Table 9.2 Trench Summary

Prospect	Area Covered (km^2)	No. of Samples	No. of Trenches	Total Length (m)	Significant Results (ppm)	Type of Sample
Achimfo	1.00	334	5	615.6	24 m @ 0.84 g/t Au	Trench
Sewum-Tokosea	0.30	520	7	992.0	34 m @ 0.31 g/t Au	Trench
Boin NW	0.40	783	11	1,563.7	10 m @ 1.64 g/t Au	Trench
Gyasikrom	0.50	292	3	540.0	no sig. assays	Trench

9.3 AUGER

Auger holes are vertical (-90º) and therefore no azimuth is required in the collar file. In the survey file, a -90º dip will be required at 0 m and at end of hole in the downhole survey file.

Sampling should be carried out on the basis of regolith geology. Lateritic soils, mottled clays, and saprolite were sampled separately. The A soil horizon was not sampled.

Duplicates were taken every 25 samples.

Table 9.3 summarizes the auger work completed.

Table 9.3 Auger Summary

Prospect	Area Covered (km^2)	No. of Samples	No. of Holes	Total Depth (m)	Significant Results (ppm)	Type of Sample
Achimfo	1.00	587	264	776.0	assays to 0.5g/t Au	Auger
Yiwabra	0.26	325	240	790.0	assays include 2.35g/t and 1.21 g/t Au	Auger
Gyasikrom	1.55	1,051	278	949.0	assays to 0.5 g/t Au	Auger

9.4 ACHIMFO

The Achimfo Target is located in the central portion of the Enchi Project, approximately one kilometre north of the Nyamebekyere deposit (Figure 9.1). The mineralized zone is located along the same structure which hosts the Nyamebekyere mineralization. Previous soil sampling at Achimfo had generated moderate anomalous results and the airborne geophysical survey highlighted a linear radiometric anomaly. Work completed consisted of five trenches for 615.6 m and 264 holes for 776 m (587 samples). The trenches and augers were completed over an area of one kilometre by one kilometre. Significant results for trenches included 24 m 0.84 g/t Au and 14.0 m @ 0.49 g/t Au (Figure 9.2).

9.5 BOIN NW

The Boin NW Target is located in the west-central portion of the Enchi Project, approximately one kilometre west-northwest of the Boin deposit (Figure 9.1). The mineralized zone is located along a sub-parallel structure to that which hosts the Boin mineralization. Previous soil sampling at Boin NW had generated moderate anomalous results, and the airborne geophysical survey highlighted a linear radiometric anomaly. Work completed consisted of 11 trenches for 1,563.7 m. The trenches exposed silicified and brecciated volcanoclastic sediments and quartz veining with disseminated sulphides. The trenches were completed over an area two kilometres long and 200 metres wide. Weakly to moderately anomalous results were returned in most trenches with significant results including 10 m @ 1.64 g/t Au, and 8.0m @ 0.49 g/t Au (Figure 9.2).

9.6 SEWUM-TOKOSEA

The Sewum-Tokosea Target is located in the south-central portion of the Enchi Project, approximately 500 to 1,500 metres north of the Sewum deposit (Figure 9.1). The mineralized zone is located along a series of structures sub-parallel and along trend from the structure which hosts the Sewum mineralization. Previous soil sampling at Sewum-Tokosea had generated moderate anomalous results, and the airborne geophysical survey outlined a series of linear radiometric anomalies. Work completed consisted of seven trenches for 992 metres. The trenches were completed over an area of two kilometres by 200 metres. The trenches exposed highly oxidized volcanoclastic sediments with brecciated quartz veins and foliated graphitic phyllites. Weakly anomalous results were returned in most trenches with significant results including 34 m @ 0.31 g/t Au (Figure 9.2).

Figure 9.1 Enchi 2012 Exploration Summary Map

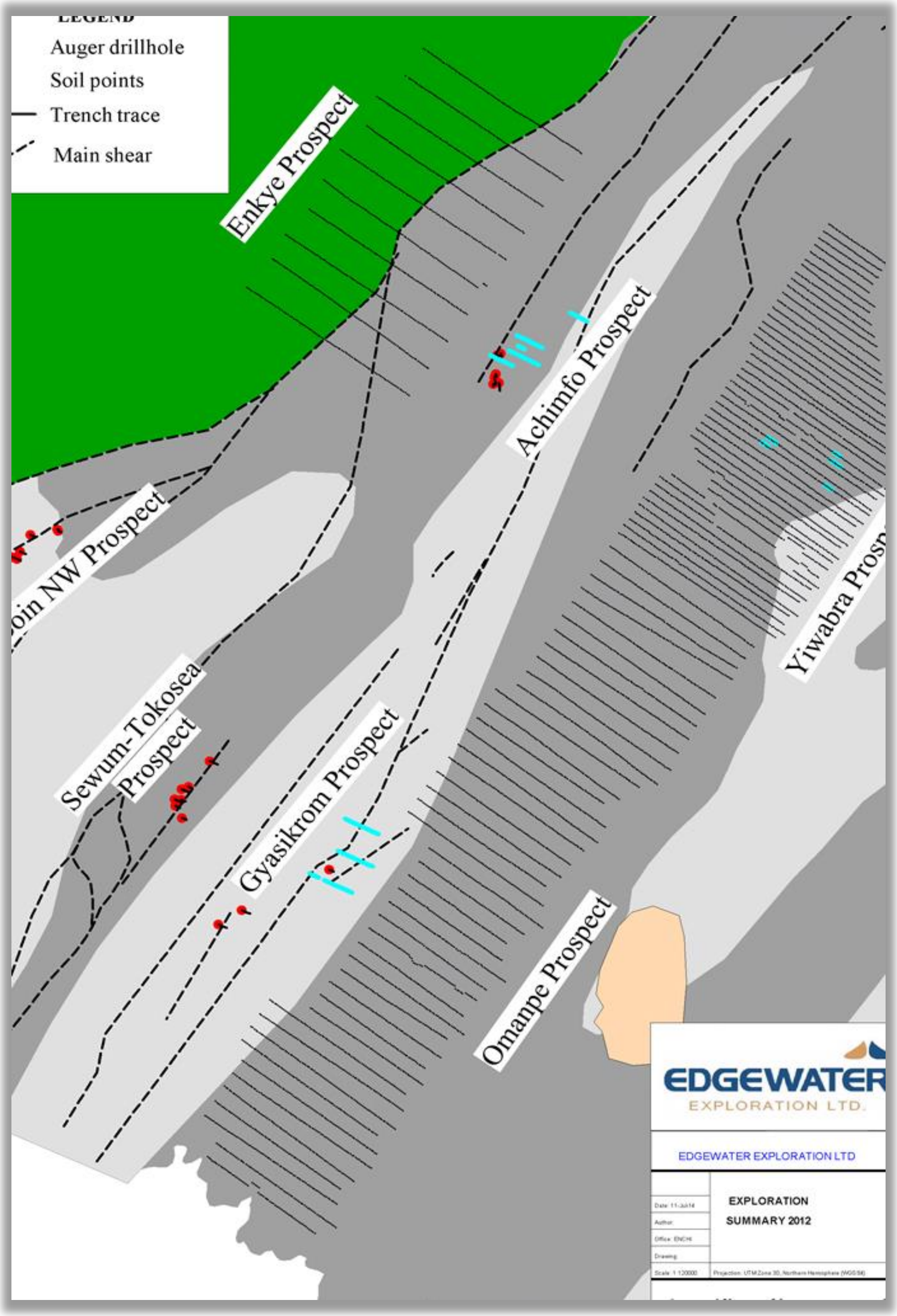
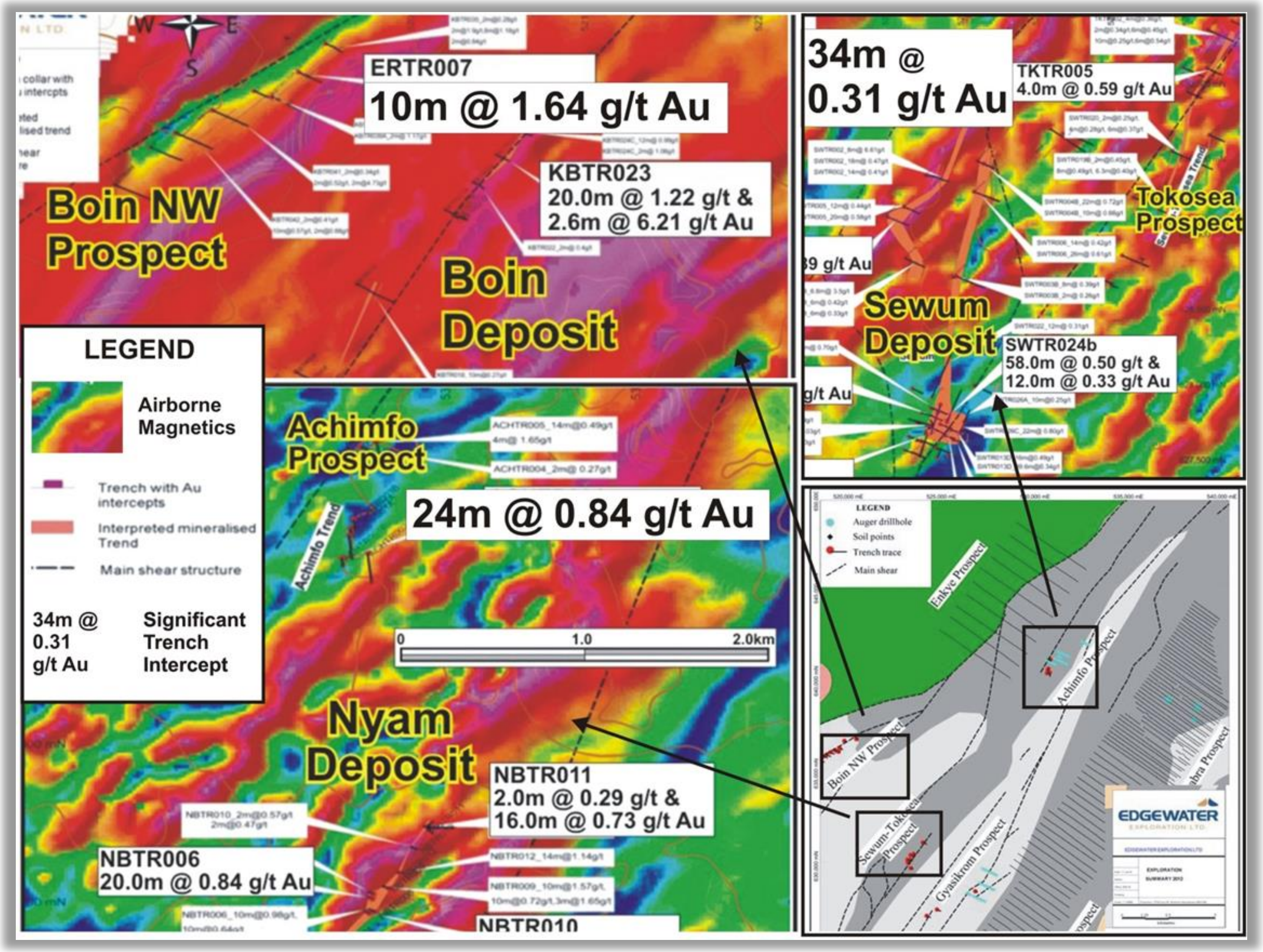


Figure 9.2 Enchi Trench Results



9.7 GYASIKROM

The Gyasikrom Target is located in the south-eastern portion of the Enchi Project, approximately two kilometres east of the Sewum deposit (Figures 9.1 and 9.2). Limited previous work had been completed in this area; this work consisted of wide-spaced soil sampling which generated isolated weakly anomalous results. The airborne geophysical survey outlined a large one kilometre by three kilometre area interpreted to be underlain by intrusive rocks. Work completed consisted of three trenches for 540 metres and 278 auger holes for 949.1 metres (1,051 samples) completed over an area of four kilometres by one kilometre. The trenches did not return anomalous values, and the auger returned isolated moderately anomalous values including 0.66 and 0.58 g/t Au (Figure 9.3).

9.8 YIWABRA

The Yiwabra Target is located in the east-central portion of the Enchi Project, approximately four kilometres east of the Nyamebekyere deposit (Figure 9.1). Limited previous work had been completed in this area; this work consisted of wide-spaced soil sampling which generated isolated weakly anomalous results. The airborne geophysical survey outlined a large area interpreted to be underlain by intrusive rocks. Work completed consisted of a detailed soils sampling program including the collection of 4,722 soil samples along 57 lines totaling 108.8 kilometres over an area of 14 kilometres by 4 kilometres. Additionally, 240 auger holes for 793.5 metres resulting in the collection of 325 samples were completed. The soil sampling generated a series of moderately anomalous results including some approximately five areas, each 100 metres wide and several hundred metres long, with generally anomalous results. The auger drilling followed-up on the anomalous soil results and returned significant values including 2.35 and 1.21 g/t Au (Figure 9.3).

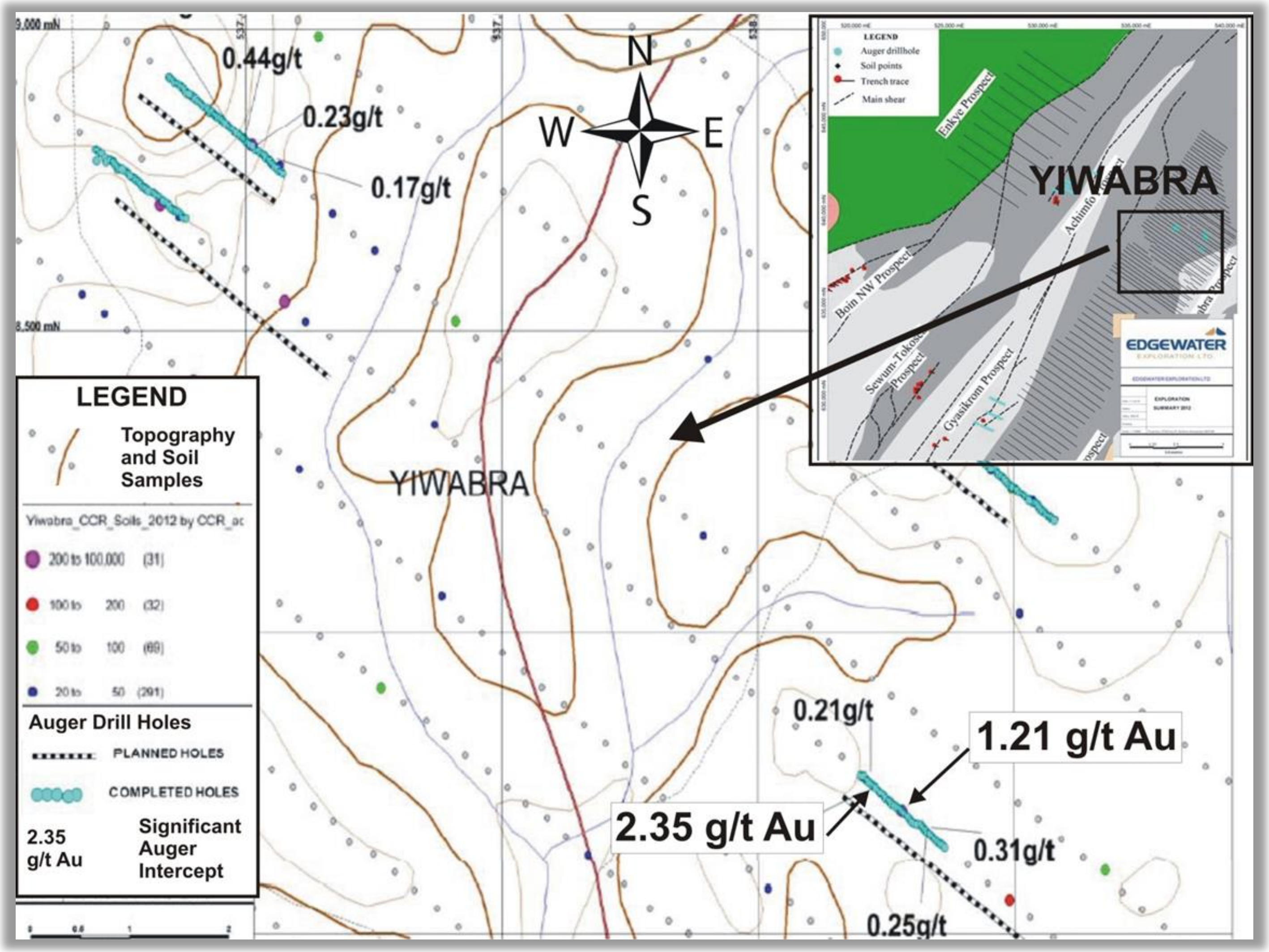
9.9 OMANPE

The Omanpe Target is located in the east-central portion of the Enchi Project, approximately five kilometres southeast of the Nyamebekyere deposit (Figure 9.1). Limited previous work had been completed in this area; this work consisted of wide-spaced soil sampling which generated isolated weakly anomalous results. The airborne geophysical survey outlined a large area interpreted to be underlain by intrusive rocks. Work completed consisted of 2,595 soil samples along 33 lines totaling 96.8 kilometres over an area of 13 kilometres by 4 kilometres. The soil sampling generated weakly and rarely moderately anomalous results often as isolated anomalous results.

9.10 ENKYE

The Enkye Target is located in the west-central portion of the Enchi Project, approximately five kilometres northwest of the Nyamebekyere deposit (Figure 9.1). Limited previous work had been completed in this area; this work consisted of wide-spaced soil sampling which generated isolated anomalous results. The airborne geophysical survey outlined a large area with moderately complex radiometric and magnetic anomalies. The line cutting and soil sampling program was completed over the interpreted volcanic–sediment contact within the Enkye license on 400 m x 50 m spacing infilling the original 800 m x 50 m. Work completed consisted of 986 soil samples completed along 10 lines of length totaling 60.0.8 kilometres over an area seven kilometres by five kilometres. The soil sampling generated a limited number of weakly anomalous results as well as three spot highs including 354, 1386, and 6453 ppb Au.

Figure 9.3 Enchi Significant Auger Results



10 DRILLING

10.1 DRILLING

The 2012 Reverse Circulation (RC) drilling program undertaken on the Project commenced in March 2012 and was completed in April 2012. A total of 25 RC drillholes were completed for a total of 4,058 m (Figure 10.1 and Table 10.1).

Figure 10.1 2012 Enchi RC Drillhole

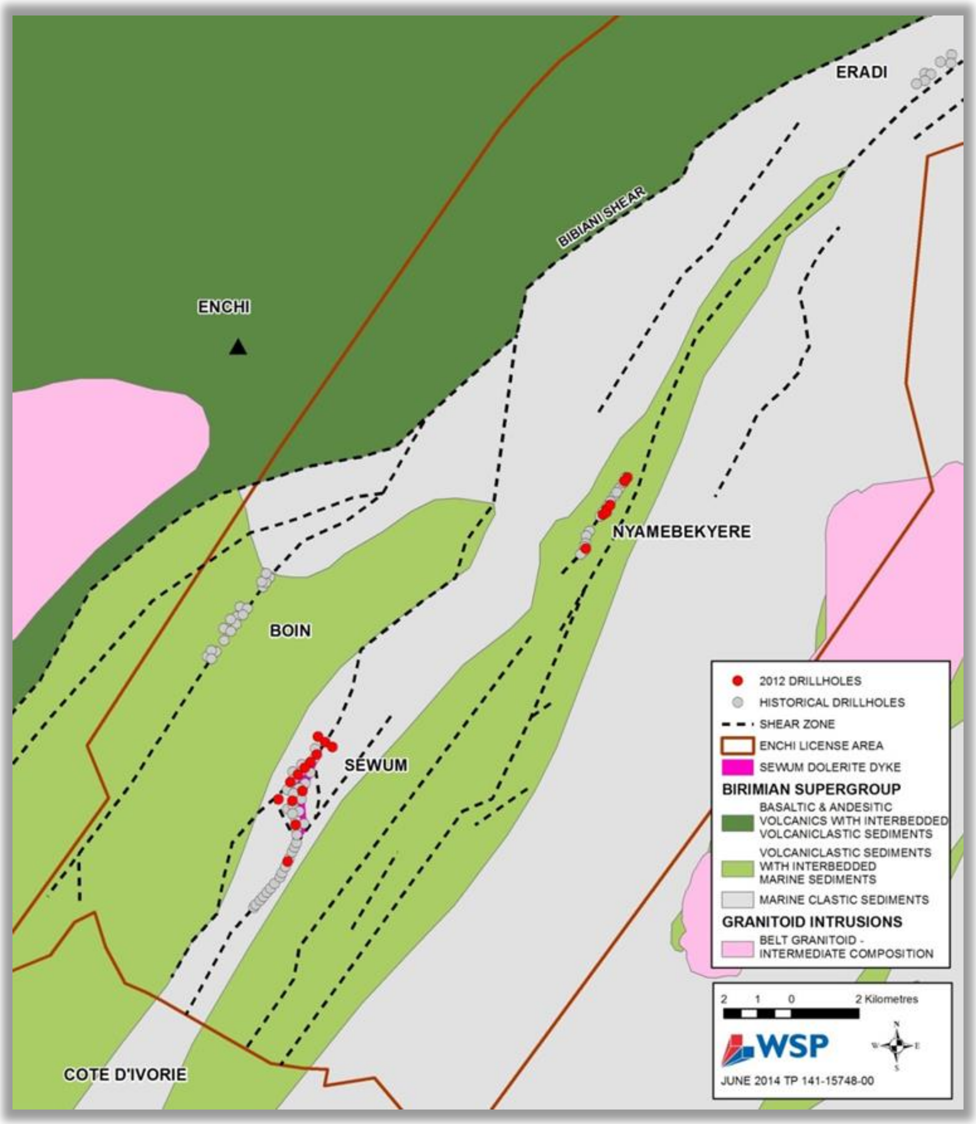


Table 10.1 2012 Enchi RC Collar Locations

Borehole ID	Hole Type	Easting	Northing	Elevation	Bearing	Dip	Depth (m)	Prospect
NBRC007	RC	531304.91	639189.88	69.85	294	-60	120.0	Nyamebekyere
NBRC008	RC	531324.98	639177.38	70.64	294	-60	130.0	Nyamebekyere
NBRC009	RC	530424.41	637522.88	91.19	294	-60	180.0	Nyamebekyere
NBRC010	RC	531079.83	638767.67	72.35	294	-60	150.0	Nyamebekyere
NBRC011	RC	531074.26	638694.50	78.32	294	-60	150.0	Nyamebekyere
NBRC012	RC	530745.87	638053.57	133.17	294	-60	220.0	Nyamebekyere
NBRC013	RC	530706.39	637955.97	100.90	294	-60	200.0	Nyamebekyere
NBRC014	RC	530651.13	637904.31	88.62	294	-60	200.0	Nyamebekyere
NBRC015	RC	530656.72	637945.96	90.32	294	-60	174.0	Nyamebekyere
SWRC041	RC	521733.72	629877.10	228.48	0	-90	150.0	Sewum
SWRC042	RC	521768.10	629965.57	181.69	0	-90	150.0	Sewum
SWRC043	RC	521771.55	629964.53	181.12	114	-50	100.0	Sewum
SWRC044	RC	521287.51	629011.41	231.08	0	-90	210.0	Sewum
SWRC045	RC	521356.04	629090.71	192.11	0	-90	216.0	Sewum
SWRC046	RC	521383.22	629175.57	230.59	0	-90	206.0	Sewum
SWRC047	RC	521533.49	629530.43	235.08	0	-90	200.0	Sewum
SWRC048	RC	521601.03	629724.12	233.58	0	-90	204.0	Sewum
SWRC049	RC	521691.94	629788.02	193.58	0	-90	162.0	Sewum
SWRC050	RC	521733.22	629877.11	228.48	114	-55	140.0	Sewum
SWRC051	RC	521293.79	628589.07	226.12	114	-60	150.0	Sewum
SWRC052	RC	521168.95	628244.19	128.67	84	-60	156.0	Sewum
SWRC053	RC	521001.41	628915.55	98.99	114	-60	120.0	Sewum
SWRC055	RC	522064.47	630264.37	119.80	114	-60	120.0	Sewum
SWRC056	RC	521894.04	630257.95	120.92	114	-60	120.0	Sewum
SWRC057	RC	521784.09	630273.10	121.12	114	-60	130.0	Sewum

10.2 NYAMEBEKYERE

Edgewater completed an RC drilling program at Nyamebekyere from between April 13 and 24, 2012. The program consisted of nine reverse circulation holes totaling 1,524 m. Seven of the RC holes targeted the known resource area while two of the holes were exploration holes, well outside the resource area. The program used a truck-mounted LC 36 operated by Boart Longyear (Figure 10.2).

Reverse circulation drilling within the resource area was designed to test the eastern shear system and the northern strike extension of the Nyamebekyere mineralized zone. All seven reverse circulation holes drilled to test the Nyamebekyere mineralized zone intersected quartz veining and zones of bleaching caused by quartz – sericite – carbonate alteration with anomalous gold results (Table 10.2). The intervals stated in the results table reflect downhole intervals and do not reflect true thickness of the mineralization.

Generally, the width and grade of the mineralization intersected in the near surface, clayey, weathered zone were better than in fresh rock, suggesting some supergene enrichment has occurred.

Figure 10.2 Reserve Circulation Drill

Table 10.2 Nyamebekyere RC Results

Borehole ID	Prospect	From (m)	To (m)	Interval (m)	Grade (g/t Au)
NBRC009	Nyamebekyere	85	88	3	0.73
		91	92	1	0.74
		108	109	1	0.42
		113	114	1	2.08
		117	126	9	0.49
NBRC010	Nyamebekyere	73	91	18	0.46
NBRC011	Nyamebekyere	113	115	2	0.51

Borehole ID	Prospect	From (m)	To (m)	Interval (m)	Grade (g/t Au)
NBRC012	Nyamebekyere	108	110	2	1.76
		117	118	1	0.46
		121	122	1	0.48
		166	174	8	0.47
NBRC013	Nyamebekyere	144	160	16	0.64
		165	166	1	0.44
NBRC014	Nyamebekyere	67	69	2	0.90
		104	105	1	0.41
		109	115	6	1.03
		124	137	13	0.80
		175	177	2	0.69
NBRC015	Nyamebekyere	55	58	3	0.82
		93	95	2	0.92
		113	116	3	2.20
		121	122	1	0.92

10.3 SEWUM

Edgewater completed 16 RC holes totaling 2,534 m at Sewum. The aim of the program was to better delineate the mineralization associated with the RTSZ.

Drilling at Sewum was completed using a truck-mounted LC 36 operated by Boart Longyear.

No new drilling was conducted on the Sewum South, ECZ, WCZ, or Checker Board areas.

The 2012 RC holes drilled to target the RTSZ were drilled either vertically or dipping east. The RTSZ is hosted within the dolerite intrusive and is situated on top of the main Sewum Ridge. The zone consists of several stacked shallow dipping shears which average 20 m in thickness, and has been traced in drilling for over 1,000 m along strike and remains along strike to the south toward the Checker Board Zone.

The northern strike extension of the RTSZ appears to be significantly thinner as evident in SWRC056 and SWRC057, with intervals approximately 7 m thick. The down dip extension of the RTSZ would be limited by the width of the dolerite intrusion. If additional zones exist at depth, these zones would appear as stacked lenses at depth. Currently, there have been no indications that such a system exists at depth.

Table 10.3 summarizes the significant results from the 2012 Sewum drilling. The intervals stated in the results table reflect downhole intervals and do not reflect true thickness of the mineralization.

Table 10.3 Sewum 2012 RC Results

Borehole ID	Prospect	From (m)	To (m)	Interval (m)	Grade (g/t Au)
SWRC041	Sewum	1	3	2	0.84
		28	30	2	1.02
		42	45	3	1.09
		134	143	9	0.44
		146	150	4	0.43
SWRC042	Sewum	62	63	1	1.35
SWRC043	Sewum	54	55	1	0.81
		89	95	6	0.77
SWRC044	Sewum	149	150	1	0.45
		171	172	1	0.47
		206	210	4	1.35
SWRC045	Sewum	23	24	1	0.61
		174	180	6	0.78
SWRC046	Sewum	30	31	1	2.84
		37	38	1	0.55
		105	106	1	1.37
SWRC047	Sewum	46	47	1	0.63
		63	64	1	0.69
SWRC048	Sewum	60	63	3	0.66
		163	169	6	0.46
SWRC049	Sewum	97	98	1	1.17
		113	114	1	0.35
		123	138	15	1.10
		144	147	3	0.40
		158	160	2	0.47
SWRC050	Sewum	61	67	6	0.99
SWRC051	Sewum				N/A
SWRC052	Sewum				N/A
SWRC053	Sewum	9	12	3	0.42
		42	43	1	0.75
		46	102	56	0.49
		118	120	2	0.45
SWRC054	Sewum				N/A
SWRC055	Sewum				N/A
SWRC056	Sewum	26	27	1	0.50
SWRC057	Sewum				N/A

10.4 REVERSE CIRCULATION DRILLING PROCEDURES

10.4.1 SURVEYING

10.4.1.1 COLLAR SURVEY

Before a hole is drilled, the proposed collar position is located by tape and compass survey from the nearest point whose coordinates are accurately known, or by hand held GPS. When there is a surveyor on site, the collar is located by electronic distance measurement (EDM) survey (Figure 10.3).

Figure 10.3 Collar Survey

The inclination is set using a clinometer attached to the rod tracks while the mast is tilted and is checked and approved by the geologist prior to the start of drilling.

Comparison of the first downhole surveys with the nominal collar dip and azimuth should be checked by the geologist.

After drilling, all holes drilled the collar locations accurately surveyed. The survey is by EDM, operated by qualified and experienced surveyors.

It was the responsibility of the geologist to enter all collar details from each day of drilling into the relevant computer file.

10.4.1.2 DOWNHOLE SURVEY

A minimum of two surveys were completed on each hole. For holes less than 100 m, the survey was completed at half-depth and at the end of hole. Holes over 100 m were surveyed at 50 m intervals and at the end of the hole.

All surveys were completed during drilling process.

10.4.2 DRILLING PROCEDURES

Only face-sampling hammers were used. A length of PVC casing was inserted into the top of the hole to a sufficient depth to create a secure seal at the top of the hole.

The hole was cleaned out at the end of each rod by blowing the hole in order to reduce any potential contamination.

The cyclone was cleaned after every hole to minimize contamination between holes.

10.4.3 CHIP LOGGING PROCEDURE

RC drill logs were completed manually on standard logging forms. All necessary fields were completed, and a standard set of codes was documented.

The geological log recorded the percentage sample recovery for each one-metre interval estimated by visual comparison.

Samples were examined and logged on site and washed chips glued to a chip board for future reference (Figure 10.4). Chip boards are stored at the Pinecrest field office in Enchi.

Figure 10.4 Chip Board Preparation

10.4.4 SAMPLING APPROACH

Sampling was done at the rig. The standard form and ticket books were filled in by a technician and signed-off by the project geologist.

A one-metre sampling interval was used in all holes with the entire hole being sampled.

10.4.4.1 DRY SAMPLING

Each sample was collected in a large plastic bag clamped tightly onto the base of the cyclone.

Each sample was weighed then a split was taken for analysis using a 4” polyvinyl chloride (PVC) tube splitter (Figure 10.5). Care was taken to ensure the tube was speared down the centre of the bag to the base of the plastic. The sample split was placed in pre-numbered calico sample bags for dispatch to the geochemical laboratory. A record was made on the geological log and in the ticket books, at the drill site, of the sample identity numbers and corresponding intervals.

The splitter was thoroughly cleaned between samples.

Figure 10.5 Reserve Circulation Sampling Using Tube Splitter

10.4.4.2 WET SAMPLES

The samples were collected in a plastic bag and the excess water drained, and as far as possible, left to settle before subsequent sampling using the same procedure as with the dry samples.

The samples were transported each day to Edgewater's core storage facility to wait shipment to the analytical laboratory. The core storage facility maintained a night watchman on the Property to ensure samples and equipment were not tampered.

10.4.5 QP'S OPINION

It is WSP's opinion that the drilling and logging procedures put in place by Edgewater meet acceptable industry standards and that the information can be used for geological and resource modeling.

11 SAMPLE PREPARATION, ANALYSES, AND SECURITY

11.1 REVERSE CIRCULATION SAMPLE PREPARATION

Each batch of samples is delivered using the Edgewater vehicles and drivers directly from site to the Intertek lab in Tarkwa, approximately a 130 km from Enchi. Each batch of samples is submitted to Intertek with a sample submission form outlining the method of preparation and analysis. Once delivered, the lab staff sign and date Edgewater's copy of the sample submission form acknowledging receipt of the samples.

The Intertek Tarkwa facility operates under the umbrella of Intertek/Genalysis Services Pty Ltd. and is independent of Edgewater. The facility is certified with the following credentials: ISO 17025 and NATA certificate 3244.

Ten percent of the samples sent to the labs were either a duplicate sample, blank, or standard.

All RC chip samples were prepared at the Intertek laboratory in Tarkwa using preparation code PT01/SP02.

Below is a brief description of the sample preparations procedure.

- Samples are sorted and dried at 105°C.
- Once dried, the entire the sample is crushed to a 75% passing at 2 mm.
- Sample is split to get a sample up to 2 kg in weight for pulverizing.
- The entire sample split is then pulverized to allow a 95% passing of 75 µm.
- The pulp is split to 150 g for analysis.

At no time was an employee, officer, director, or associate of Edgewater involved in the preparation of the samples.

11.2 REVERSE CIRCULATION ANALYTICAL PROCEDURE

A 50 g portion of pulverized sample is weighed, mixed with a fluxing reagents containing litharge (PbO) and then placed into fusion furnace and fused at approximately 1,100°C. During this stage, the reduced lead collects the precious metals and forms a button. The sample is then removed from the furnace and cooled. The lead button is separated from the silicate slag.

The second stage of fire assay is called cupellation. During the cupellation process at approximately 950°C, the lead in the button oxidizes and is absorbed into the cupel leaving a precious metal bead known as a prill. The resultant prill is digested with Aqua Regia, by adding nitric acid first to dissolve the silver and then hydrochloric acid. Gold content is determined by Atomic Absorption spectrometer. The detection threshold limits are in the range of 0.01 ppm to 100 ppm.

At no time was an employee, officer, director, or associate of Edgewater involved in the preparation or analysis of the samples.

11.3 SOIL SAMPLE PREPARATION AND ANALYSIS

Soil samples were dried and pulverised to 90% -75 micron.

Analysis was completed by 50 g fire assay with aqua regia digest and di-isobutyl ketone (DIBK) extraction with AAS finish at a detection limit of 1 ppb.

11.4 TRENCH SAMPLE PREPARATION AND ANALYSIS

Trench samples were dried and pulverised to 90% -75 micron.

Analysis was completed by 50 g fire assay with aqua regia digest with AAS finish at a 10 ppb detection limit.

11.5 AUGER

Auger samples were dried and pulverised to 90% -75 micron.

Analysis was completed by 50 g fire assay with aqua regia digest and DIBK extraction with AAS finish at a detection limit of 10 ppb.

11.6 QA/QC

11.6.1 SOIL

Blanks were inserted at a frequency of one every 50 samples with a minimum of one per batch. The material consisted of red-brown soils (2.5 kg) collected in Accra.

Commercial standards were inserted at a frequency of one every 50 samples with a minimum of one per batch.

WSP has not reviewed the QA/QC results for the soil survey program.

11.6.2 TRENCH

Blanks were inserted at a frequency of one every 50 samples with a minimum of one per batch. The material consisted of oxide rock fragments supplied from Accra.

Commercial standards were inserted at a frequency of one every 50 samples with a minimum of one per batch.

The results of the trench QA/QC samples were incorporated with the RC results and charted accordingly.

11.6.3 AUGER

Blanks were inserted at a frequency of one every 50 samples with a minimum of one per batch. The material consisted of red-brown soils (2.5 kg) collected in Accra.

Commercial standards were inserted at a frequency of one every 50 samples with a minimum of one per batch.

WSP has not reviewed the QA/QC results for the soil survey program.

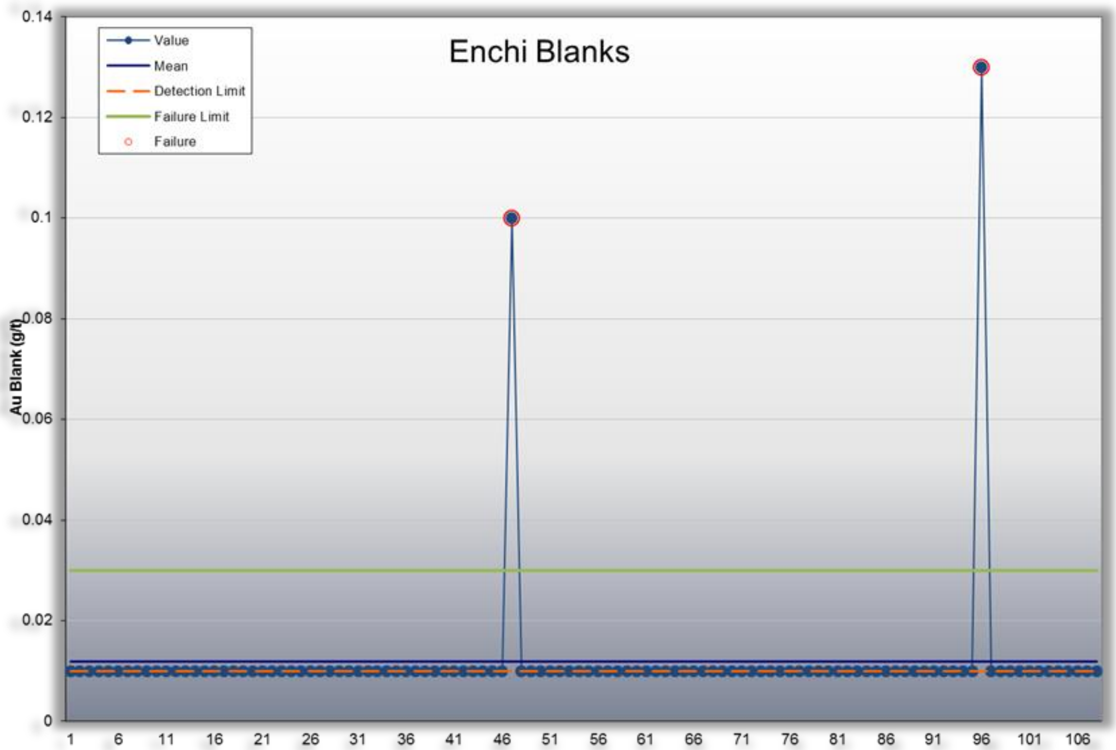
11.6.4 REVERSE CIRCULATION

Every 10th sample submitted was a QA/QC sample. These samples were prepared prior to core sampling and were placed in the sample stream. Every 20th sample was a duplicate and in between the duplicates was either a standard or a blank. Duplicate samples were prepared at the lab. The entire sample was crushed to -2 mm and two splits (less than 1.5 kg) were collected from the one sample using a Jones Splitter which was then processed as separate samples.

11.6.4.1 BLANKS

A total of 108 blank samples were submitted to test for preparation contamination or carry over. A failure was considered to be three times the detection limit. A total of 3 samples, or 2% of the samples, failed (Figure 11.1). A single sample was removed from the blank dataset as it returned the same value as one of the standards.

Figure 11.1 Enchi Blank QA/QC Chart

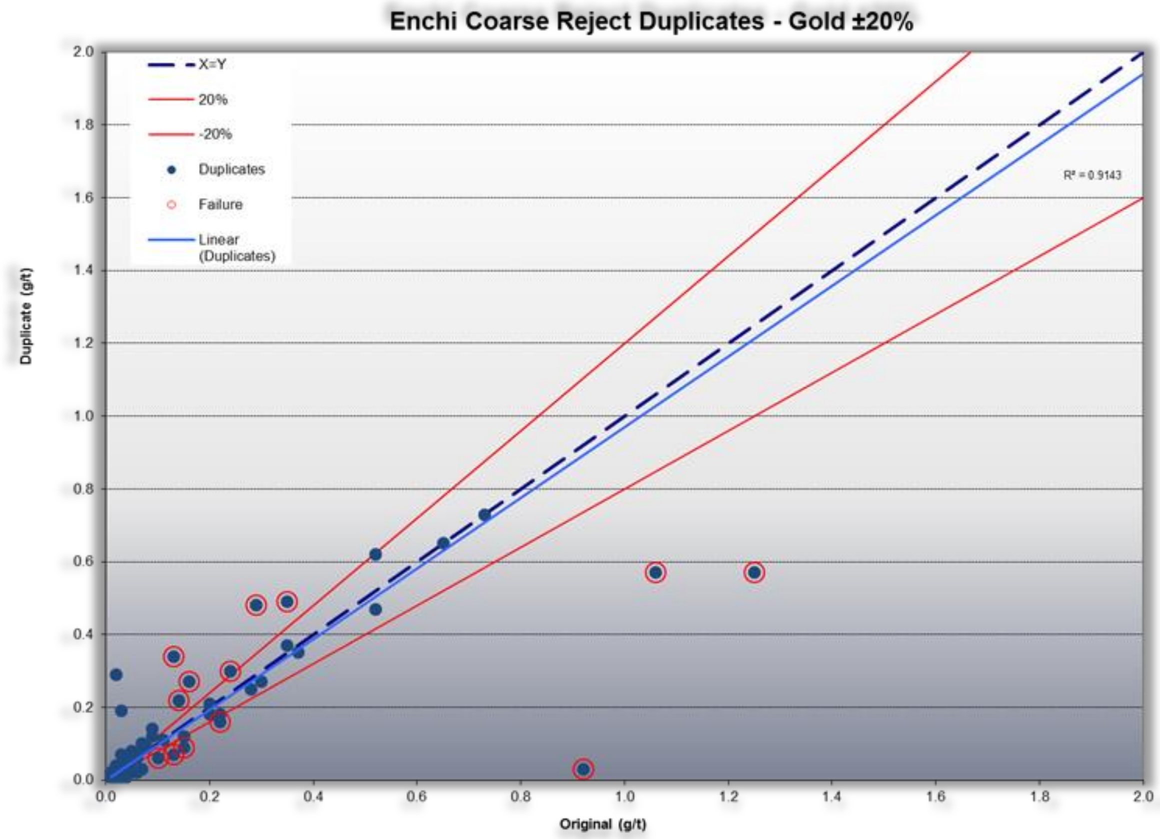


11.6.4.2 DUPLICATES

A total of 211 course rejects duplicate samples were submitted. The control limit of ±20% is typically considered a failure by industry standards. A total of 13 samples, or 6%, failed (Figure 11.2). If the samples below 0.1 g/t are not considered in the dataset, the failure rate increases to 50%.

This is a high failure rate. Due to the nature of gold mineralization, it is not uncommon to have a high failure rate. Efforts have been made to minimize the variation of the grades within the samples by using a larger sample size. Edgewater should work with the laboratory to determine what preparation and analytical methodology should be used to minimize the variation of the assays.

Figure 11.2 Enchi Course Reject Duplicate QA/QC Chart



11.6.5 STANDARDS

The charts generated for the Standard Reference Materials (SRM) have two components. The top portion of the chart displays the accuracy, which is how close the result come the expected value. The bottom portion of the chart displays the precision to the results, which is how repeatable the results are from one sample to the next.

Five separate SRM were used during the drilling program with grades ranging from 0.36 g/t gold up to 6.75 g/t gold. The SRM GLG904-6, with an expected value of 0.36 g/t, had 20 samples submitted and returned an average of 0.361 g/t (Figure 11.3). The SRM G909-10, with an expected value of 0.52 g/t, had 20 samples submitted and returned an average of 0.508 g/t (Figure 11.4). There is a significant amount of variability in the results specifically Samples 13 and 14 which are considerably lower than the rest of the dataset.

The SRM G901-7, with an expected value of 1.52 g/t, had 22 samples submitted and returned an average of 1.507 g/t gold (Figure 11.5). The SRM G995-1, with an expected value of 2.75 g/t, had 22 samples submitted and returned an average grade of 2.736 g/t gold (Figure 11.6). The SRM G905-10, with an expected value of 6.75 g/t, had 16 samples submitted and returned an average grade of 6.89g/t gold (Figure 11.7).

Figure 11.3 Enchi GL904-6 QA/QC Chart

Figure 11.4 Enchi G909-10 QA/QC Chart

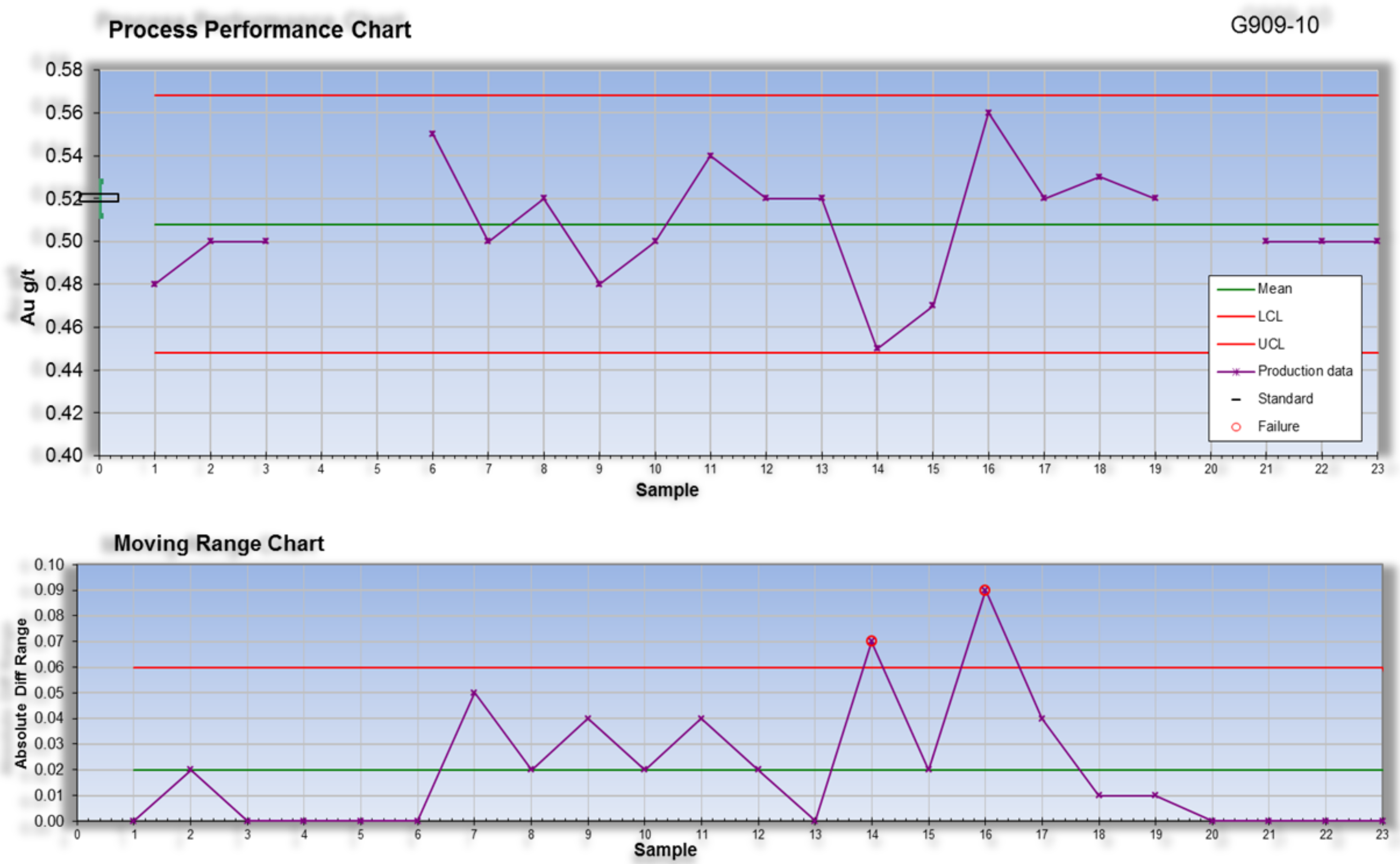
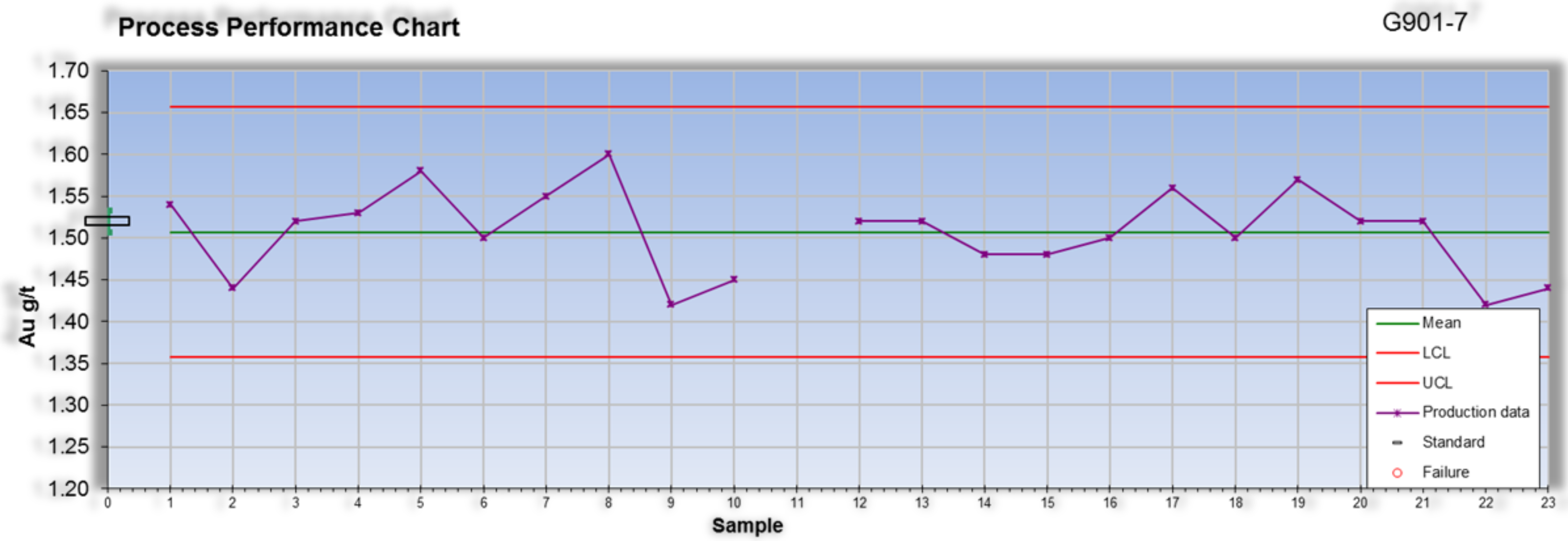


Figure 11.5 Enchi G901-7 QA/QC Chart



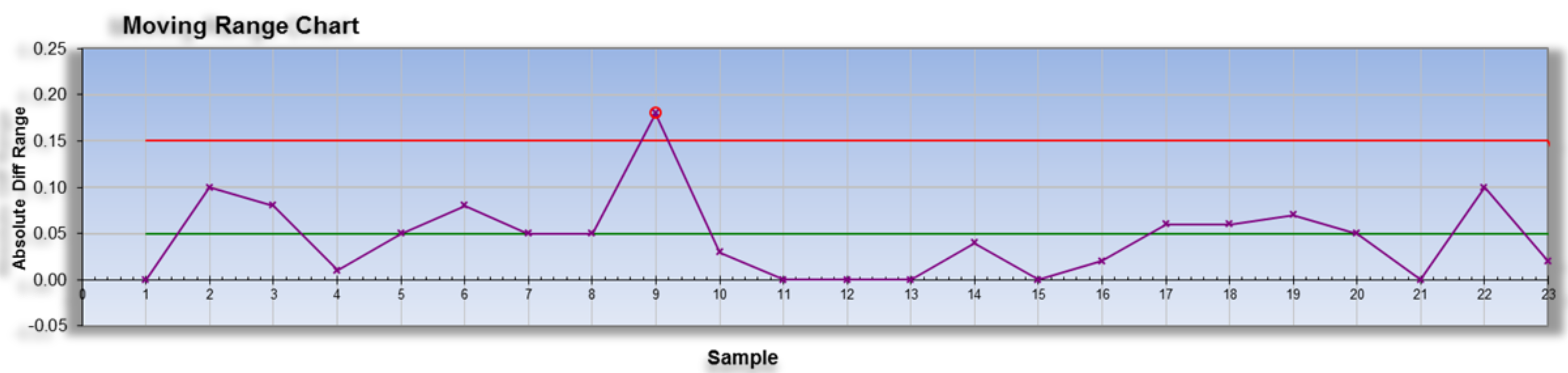


Figure 11.6 Enchi G995-1 QA/QC Chart

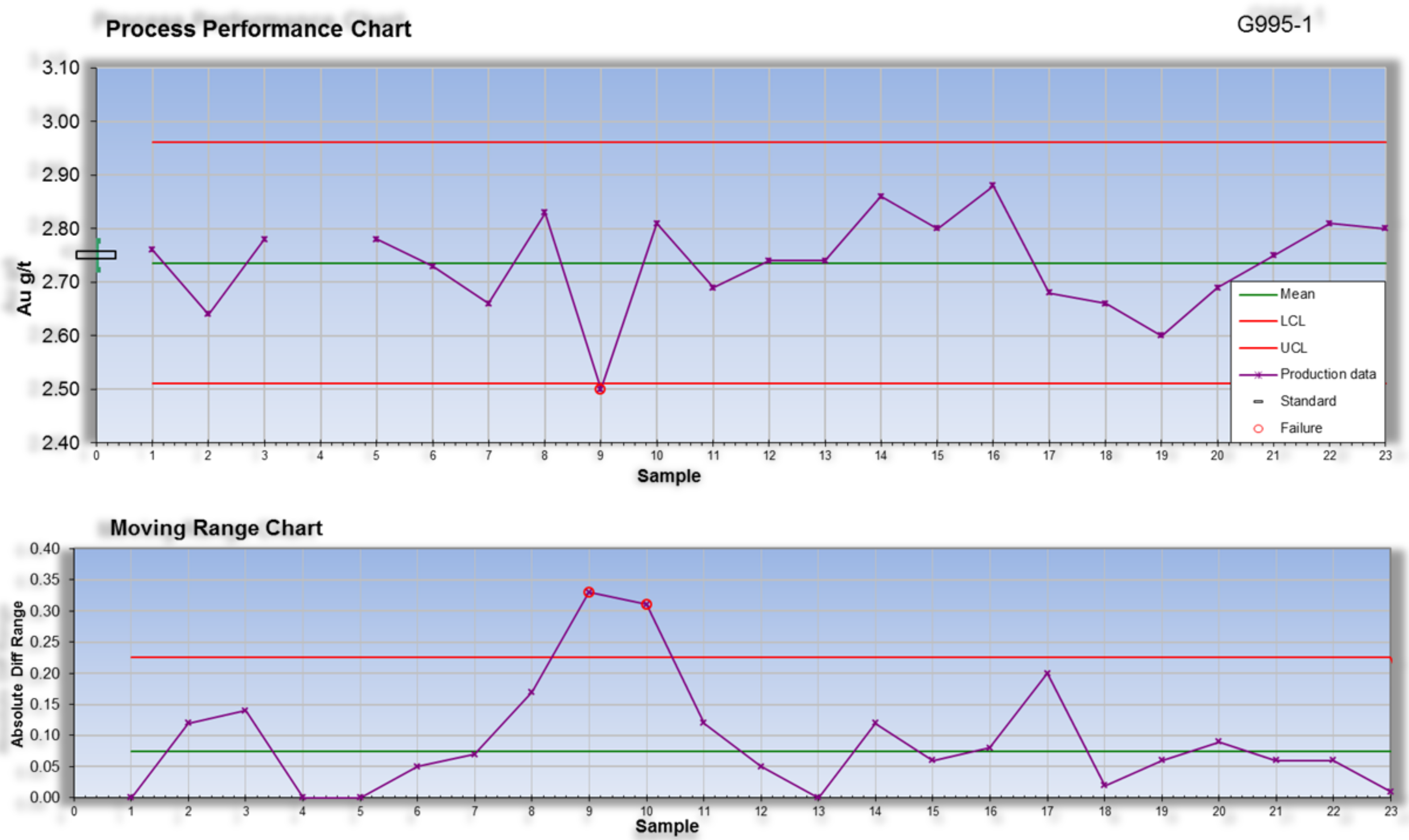
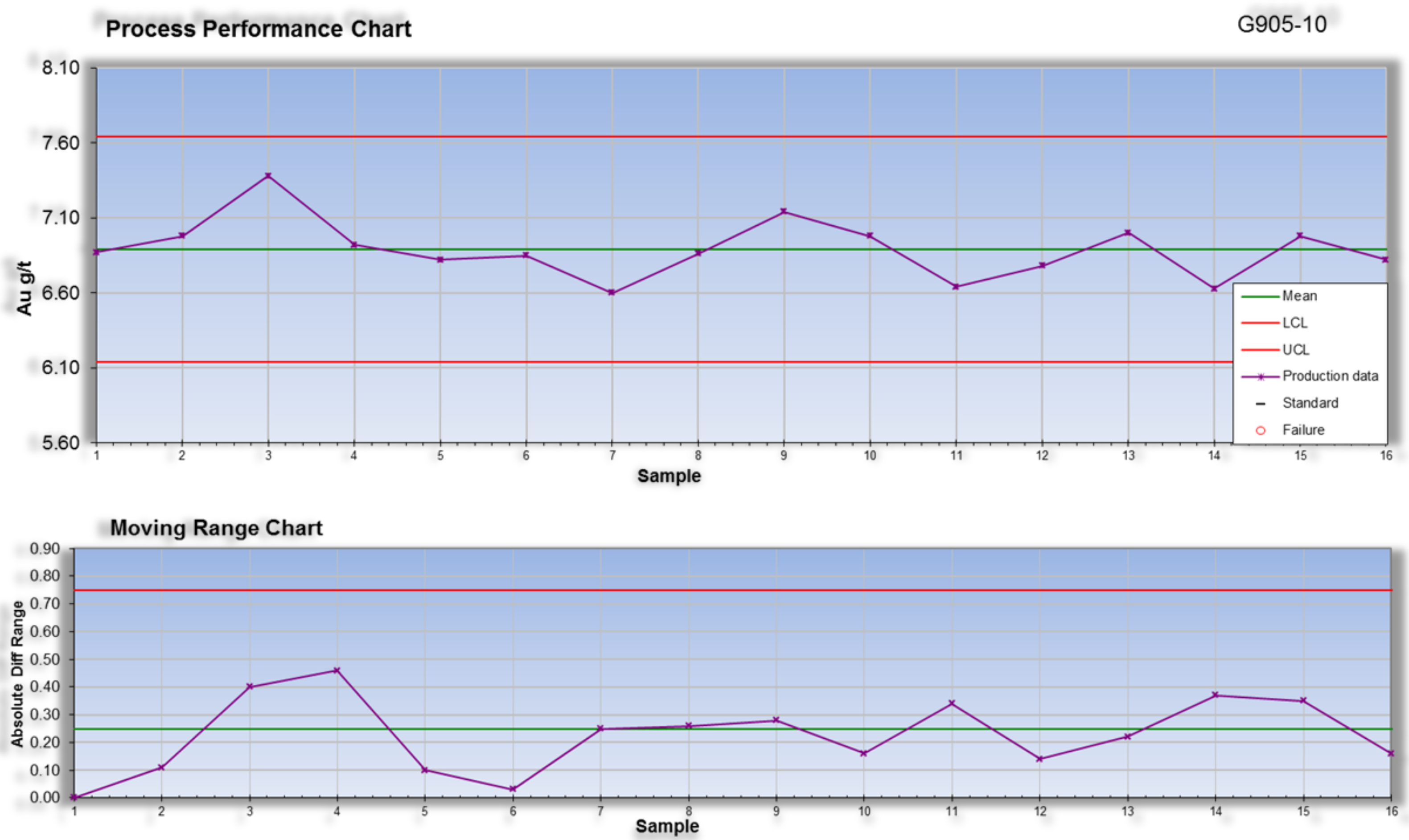


Figure 11.7 Enchi G905-10 QA/QC Chart



11.7 QP'S OPINION

It is WSP's opinion that the sample preparation, analytical procedures, and security measures put in place meet acceptable industry standards and that the information can be used for geological and resource modeling.

12 DATA VERIFICATION

12.1 DRILL COLLAR

A validation of the Edgewater 2012 reverse circulation drill collars was conducted during the 2014 site visit. Twenty-one collars, representing 2% of the drilling completed on the Project, were surveyed using a handheld Garmin GPSMAP 62. GPS readings were collected in Universal Transverse Mercator (UTM) World Geodetic System (WGS) 84 coordinate system (Figure 12.1). Table 12.1 contains the results of the collar checks.

The accepted error for the handheld GPS is typically 3 to 5 m in the X and Y coordinates. Three collars are outside the customary error range. There appears to still be issues with the Z coordinates in the database relative to the GPS. Although the Z coordinates from a handheld GPS tend to have a large error, the elevation of the drill collars did not match the topographic file provided.

Figure 12.1 Collar Validation

Table 12.1 Collar Validation

	Edgewater Exploration				WSP			X-Y
BHID	Easting	Northing	Elevation	BHID	Easting	Northing	Elevation	Delta
SWRC041	521734	629877	228	SWRC041	521735	629875	196	2.46
SWRC042	521768	629966	182	SWRC042	521767	629966	190	1.19
SWRC043	521772	629965	181	SWRC043	521771	629960	190	4.56
SWRC044	521288	629011	231	SWRC044	521289	629015	193	3.88
SWRC045	521356	629091	192	SWRC045	521358	629089	194	2.60
SWRC046	521383	629176	231	SWRC046	521384	629179	196	3.52
SWRC047	521533	629530	235	SWRC047	521535	629527	198	3.75
SWRC048	521601	629724	234	SWRC048	521599	629723	197	2.32
SWRC049	521692	629788	194	SWRC049	521691	629786	195	2.23
SWRC050	521733	629877	228	SWRC050	521733	629880	195	2.90
SWRC051	521294	628589	226	SWRC051	521290	628592	200	4.79
SWRC052	521169	628244	129	SWRC052	521166	628242	138	3.67
SWRC053	521001	628916	99	SWRC053	521000	628918	114	2.83
SWRC055	522064	630264	120	SWRC055	522059	630268	131	6.56
SWRC056	521894	630258	121	SWRC056	521887	630262	128	8.12
SWRC057	521784	630273	121	SWRC057	521777	630279	127	9.23
NBRC009	530424	637523	91	NBRC009	530425	637524	100	1.27
NBRC012	530746	638054	133	NBRC012	530746	638054	145	0.45
NBRC013	530706	637956	101	NBRC013	530701	637956	113	5.39
NBRC014	530651	637904	89	NBRC014	530650	637904	101	1.18
NBRC015	530657	637946	90	NBRC015	530656	637947	103	1.26

12.2 ASSAY

WSP collected 38 pulps from the drilling program and re-submitted the samples to ALS laboratories in Sudbury for check analysis. WSP used the same analytical procedure as Edgewater in order to minimize the potential variance from different analytical methods.

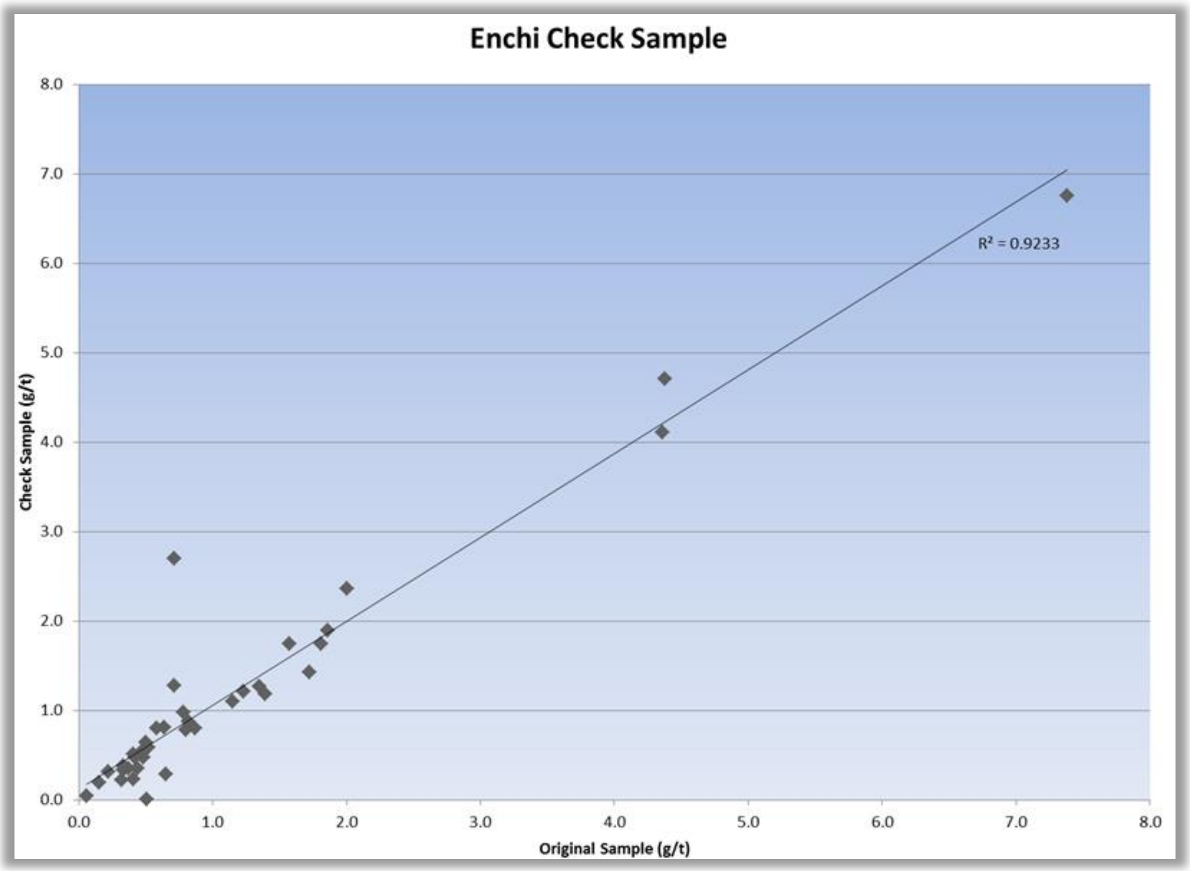
Overall, the data collected has a strong correlation to the original samples submitted by Edgewater (Table 12.2) with a R2 of 0.92 (Figure 12.2).

Table 12.2 Check Analysis

Borehole ID	Sample ID	Gold (g/t)	Sample ID	Gold (g/t)	Log-QC (% passing 75 μM)
NBRC009	1046734	0.51	120087500920	0.005	75.7
	1046763	0.41	120087501210	0.51	88.9
	1046778	1.23	120087501360	1.22	94.9
NBRC010	1046910	0.50	120087600680	0.64	
	1046935	1.35	120087600930	1.27	56.3
	1046940	0.37	120087600980	0.35	80.6
NBRC011	1047110	7.38	120088001020	6.75	
	1047115	0.33	120088001070	0.33	92.2
	1047135	0.42	120088001270	0.48	94.9
NBRC012	1047297	1.39	120088501220	1.19	87.6
	1047310	0.48	120088501350	0.48	
	1047352	0.15	120088501770	0.20	82.8
NBRC013	1047538	0.22	120089401180	0.32	
	1047604	0.44	120089401840	0.35	56.0
NBRC014	1047782	1.81	120098401400	1.74	92.0
	1047786	0.06	120098401440	0.04	90.0
	1047837	0.80	120098401950	0.78	84.2
NBRC015	1047978	0.78	120101101140	0.98	95.1
	1047992	4.36	120101101280	4.11	87.8
SWRC041	1042704	1.72	120061400330	1.43	89.9
	1042828	0.65	120061401570	0.29	75.5
	1042836	0.46	120061401650	0.51	92.8
SWRC043	1043104	0.48	120065001000	0.56	82.4
	1043108	0.87	120065001040	0.80	88.9
	1043114	0.32	120065001100	0.22	83.6
SWRC044	1043337	0.52	120065102220	0.58	90.1
	1043345	0.71	120065102300	1.28	80.6
	1043348	0.82	120065102330	0.87	80.4
SWRC047	1043888	0.71	120068300710	2.70	
SWRC048	1044108	1.15	120068600680	1.10	94.9
	1044223	0.64	120068601830	0.81	88.4
	1044265	0.41	120068602250	0.23	89.2
SWRC049	1044408	0.58	120069401420	0.80	94.6

Borehole ID	Sample ID	Gold (g/t)	Sample ID	Gold (g/t)	Log-QC (% passing 75 μM)
	1044411	2.00	120069401450	2.36	78.0
	1044415	1.57	120069401490	1.75	84.7
SWRC050	1044515	0.33	120069500690	0.38	93.1
	1044520	4.38	120069500740	4.71	
	1045046	1.86	120089401650	1.90	50.5

Figure 12.2 Enchi Check Assay



In addition to the assay, WSP had the pulps checked for pulp fineness. The Intertek standard is listed as 95% passing 75 µm. Only 10 samples had 90% passing 75 µm of 31% of the samples. This discrepancy must be addressed with the laboratory prior to any further work being completed.

12.3 DATABASE

12.3.1 EDGEWATER 2012 DATA VALIDATION

WSP carried out an internal validation of the diamond drillhole data files against the original drillhole logs and assay certificates. The validation of the data files was completed on the 23 drillholes finished in 2012.

Data verification was completed on collar coordinates, end-of-hole depth, downhole survey measurements, from and to intervals, assay sample intervals, and analytical results. Assay intervals in the database listed as less than 0.01 were converted to a value of 0.01 and were not considered an error. Sample intervals that were not assayed were input as absent data. It is WSP's opinion that material not sampled should not be assigned a zero value.

A significant error rate in the collar coordinates was indicated in the validation (Table 12.3). The collars in the digital database match reasonably well with the GPS coordinates collected during the site visit. It would appear that the drill logs were not updated with the correct coordinates after the final survey was completed.

There is a 14.9% error rate in the survey data in the digital data compared to the drill logs. The electronic survey files were reviewed and indicate that the digital database results are correct. The errors are always the last reading in the hole.

The drillhole data was imported into the Surpac™ program, which has a routine that checks for duplicate intervals, overlapping intervals, and intervals beyond the end-of-hole. The errors identified in the routine were checked against the original logs and corrected.

It is WSP's opinion that the data is of sufficient quality to support the resource estimation.

Table 12.3 Data Validation Summary

Field	Number of Records	Number of Errors	Error Rate
Collar			
Hole ID	23	0	0%
East	23	19	83%
North	23	19	83%
Elevation	23	0	0%
Azimuth	23	0	0%
Dip	23	0	0%
Depth	23	0	0%
Survey			
Hole ID	87	0	0%
Depth	87	0	0%
Azimuth	87	13	15%
Dip	87	13	15%
Lithology			
Hole ID	3806	0	0%

Field	Number of Records	Number of Errors	Error Rate
From	3806	0	0%
To	3806	0	0%
Litho	3806	37	1%
Assay			
Hole ID	3800	0	0%
Sample #	3800	0	0%
From	3800	0	0%
To	3800	0	0%
Au	3800	4	0%

12.3.2 EDGEWATER PRE-2012 DATA VALIDATION

Tetra Tech validated 18 of the 180 drillholes completed in 2011. The QP of the Tetra Tech report is the current QP therefore WSP accepts the results of the Tetra Tech validation.

12.3.3 RED BACK VALIDATION

The trench, rotary air blast, and reverse circulation drilling log formats, procedures and dictionaries are found in the Exploration Procedures Manual provided by Red Back during the 2010 site visit conducted by Tetra Tech.

All Red Back geological logging and sampling was conducted by geologists at the face, or on the rig, manually using standardized paper copy logging forms and dictionaries. All hard-copy field logs were manually transcribed by a data entry clerk into a Red Back designed Microsoft Access™ front-end database. The front-end database was designed with a set of data entry forms, the digital equivalent of the exploration manual, to capture all drillhole and trench collar, survey, geology, and sampling data. Each alphanumeric field, or attribute, has a linked look-up tables, which controls the entry of the specifically defined dictionary codes for each of the defined database attributes. This prevents the entry of incorrect codes. The numeric fields included in the survey, sampling, and geology forms were also manually transcribed to complete the database for each project.

Following data entry, each drillhole or trench log is printed out for the logging geologist to validate and approve, or sign-off. The file is then transferred to the senior geologist to compile into the drillhole database. Micromine™ software has been used by the senior geologists to validate and compile the 3D drillhole databases at both the Boin and Sewum zones. Micromine™ includes a variety of techniques to validate the drillhole data. Senior geological staff completes the validation of the Project drillhole databases and all reverse circulation and diamond drill geological, geotechnical and structural logs were reviewed during the 2005 and 2006 programs, prior to compiling the final resource and project sections.

The numeric assay data, produced by Transworld and Analabs labs were merged and validated into the Access™ database through Datashed™ in Accra's head office. The senior geologist at site is responsible for the routine analysis and reporting on the QA/QC standards, blanks, and duplicates submitted during the programs.

Red Back routinely submitted a combined 12% quality control component with project sampling, comprised of 8% blind field duplicates, 2% in-house blanks, and 2% Rocklabs certified reference material (CRM) standards.

12.4 QP'S OPINION

It is WSP's opinion that the database has been adequately validated and is suitable to be used for geological and resource modeling.

13 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 MINERALOGY

The three main zones (Boin, Nyamebekyere, and Sewum) are generally considered to be mesothermal quartz vein style gold deposits. The mineralization is found in structurally controlled zones of quartz veining or silicified volcanics with pyrite. With quartz-vein style mineralization, the gold occurs mainly as liberated gold particles but may have some disseminated gold. Gold is present in saprolite outcrops and chlorite and epidote clots and has very low levels of sulphides, less than 1% S; other metal contents are low such as less than 2 ppm silver, and 100 ppm copper. The levels of gangue minerals such as quartz, chlorite, carbonates and other carbonaceous matter are not known. They may have a negative impact on the extraction of gold, as they tend to re-adsorb the gold after it has been leached. Kaolin content should also be analysed since its presence will result in reducing percolation in the heaps, increasing leach time and reducing the overall gold recovery.

13.2 METALLURGICAL TEST WORK

Preliminary test work for the three oxide zones, at Boin, Nyamebekyere, and Sewum, was carried out by Edgewater and SGS in 2012. The following section was extracted from Edgewater's internal report 'Summary of Metallurgical Tests Completed on Samples from the Enchi Gold Project'. The sampling and analysis were completed in two stages:

- First stage consisted of bottle roll tests on a series of samples from one drillhole at the Boin deposit.
- Second stage consisted of two sets of bottle roll tests on a series of samples from drillholes at the Boin, Nyamebekyere and Sewum deposits.

The basic coarse bottle roll tests were conducted per SGS standard bulk leach extractable gold (BLEG) method which is a partial extraction procedure that involves leaching of 1,000 g samples with a cyanide solution for at least 24 hours. In addition, other fine grind bottle roll tests were carried out to provide indicative gold recovery information.

During the first stage of bottle roll tests, a total of 23 samples (25 were submitted but two samples were not analysed) were tested for cyanide soluble analysis. The samples were taken from drillhole KBRC-011 and consisted of a well-mineralized and strongly- to very-strongly oxidized section of the Boin deposit. The interval ranged in depth from 105 to 128 metres. The portion of samples with intervals between 107 to 113 metres contained gold grades below the base cut-off of 0.7 g/t Au and returned below average recoveries. Table 13.1 lists the samples tested for head grade, pregnant leach solution (PLS), and tailings grade.

Table 13.1 CN Bottle Roll Tests Analysis on Primary Mineralization from Boin Deposit Drillhole KBRC-011

Hole ID	Sample ID	Orig FA Head g/t	FA PLS g/t	FA Tails g/t	Simple Recovery %	Balanced Recovery %
KBRC011	77469	0.79	0.72	0.06	91.14	92.31
KBRC011	77470	1.58	1.45	0.08	91.46	94.75
KBRC011	77471	1.14	0.71	0.38	62.28	65.14
KBRC011	77472	0.70	0.30	0.19	42.86	61.22
KBRC011	77473	1.17	0.76	0.34	64.96	69.09
KBRC011	77474	0.63	0.40	0.01	63.49	97.56
KBRC011	77475	0.53	0.24	0.07	45.28	77.42
KBRC011	77476	0.54	0.26	0.08	48.15	76.47
KBRC011	77477	0.81	0.46	0.09	56.79	83.64
KBRC011	77478	1.46	1.32	0.16	90.41	89.19
KBRC011	77479	1.56	1.14	0.22	73.08	83.82
KBRC011	77480	6.65	4.29	1.48	64.48	74.33
KBRC011	77481	2.11	1.54	0.42	72.99	78.57
KBRC011	77482	1.08	1.02	0.07	94.44	93.58
KBRC011	77483	1.46	1.45	0.09	98.97	94.14
KBRC011	77485	3.97	3.13	0.52	78.84	85.75
KBRC011	77487	12.98	-	-	-	-
KBRC011	77488	7.74	-	-	-	-
KBRC011	77489	3.05	2.43	0.64	79.51	79.12
KBRC011	77490	2.53	2.24	0.21	88.54	91.43
KBRC011	77491	2.50	2.12	0.42	84.80	83.46
KBRC011	77492	1.29	1.14	0.32	88.37	78.08
KBRC011	77493	0.30	0.22	0.04	73.33	84.62
Mean % Recovery					**74.01**	**82.56**

The overall simple recovery using the original head fire assay and PLS analysis by AAS is 74% and ranges between 98.9% and 42.9%.

The overall balanced recovery using the calculated PLS and tailings analysis is 82.5% and ranges between 97.5% and 61.2%.

During the second stage of bottle roll tests, two sets of samples (total of 20 samples) were tested for cyanide soluble analysis. The first set included a total of 11 samples (8 with results) from drillholes located within the Boin and Sewum deposits. The second set included a total of nine samples from drillholes located within the Nyamebekyere and Sewum deposits. Tables 13.2 to 13.4 list results for PLS and tailings of the selected samples.

Table 13.2 CN Bottle Roll Tests Analysis of Selected Samples from Boin Deposit

Hole ID	Sample ID	Depth from m	Depth to m	BLE61K PLS g/t	FA Tails g/t	Balanced Recovery %
KBDD050A	1033615	31	32	1.27	0.42	75.15
KBDD050A	1033661*	72	73	0.01	0.05	16.67
KBDD045	1032361	31	32	1.85	0.14	92.96
KBDD045	1033362	32	33	7.89	0.61	92.82
Mean % Recovery						**86.98**

Table 13.3 CN Bottle Roll Tests Analysis of Selected Samples from Nyamebekyere Deposit

Hole ID	Sample ID	Depth from m	Depth to m	BLE61K PLS g/t	FA Tails g/t	Balanced Recovery %
NBRC012	1047296	108	109	1.68	1.06	61.31
NBRC012	1047297	109	110	0.45	0.44	50.56
NBRC014	1047782	125	126	1.47	0.40	78.61
NBRC014	1047783	126	127	0.91	0.19	82.73
NBRC014	1047784	127	128	0.94	0.28	77.05
Mean % Recovery						**70.05**

Table 13.4 CN Bottle Roll Tests Analysis of Selected Samples from Sewum Deposit

Hole ID	Sample ID	Depth from m	Depth to m	BLE61K PLS g/t	FA Tails g/t	Balanced Recovery %
SWRC034	1041734*	96	97	0.05	0.02	71.43
SWRC035	1041915	159	160	0.16	0.08	66.67
SWRC036	1042036	108	109	0.01	0.90	1.10
SWRC037	1042204	129	130	0.19	0.61	23.75
SWRC038	1042287	64	65	NA	NA	NA
SWRC038	1042292	68	69	0.01	0.65	1.52
SWRC038	1042332	104	105	0.06	0.75	7.41
SWRC053	1045046	93	94	0.27	1.58	14.59
SWRC053	1045047	94	95	0.31	0.99	23.85
SWRC054	1045138	56	57	0.20	0.68	22.73
SWRC054	1045139	57	58	0.10	1.34	6.94
Mean % Recovery						**18.73**

** Samples 1033661 and 1041734 were removed from the review of the results as the fire assay (as well as BLEG result) did not confirm the original assay and the samples were found to contain negligible gold; it is believed there was a sample mix-up. The lab did not report results for sample 1052287.*

Good metallurgical recoveries were achieved from the Boin and Nyamebekyere samples, averaging 87% and 70% respectively, while only one sample from Sewum indicated a reasonable recovery at 67%. The remaining samples from Sewum showed poor recoveries.

Strongest correlation is with zone (Boin > Nyamebekyere > Sewum). Bi-modal results with nine samples from Boin, Nyamebekyere and Sewum averaging 75.3% recovery, and eight samples from Sewum averaging 12.7% recovery. There is moderate correlation with grade, and weak to no correlation with sample depth and weathering intensity.

13.3 CONCLUSIONS

Based on the results of these basic bottle roll tests, it was suggested that heap leaching using a cyanide solution may be a viable option for extraction of gold from the oxide domains. WSP cautions that these preliminary bottle roll tests are dynamic tests and do not necessarily indicate the material's amenability to heap leaching. Static column leach tests need to be undertaken to specifically determine heap leach amenability. While helpful as a guide for cyanide solubility, the bottle roll tests are preliminary and are not sufficient to make any meaningful conclusions on the metallurgy of the three zones involved in the Project.

Results on samples taken from one drillhole at the Boin deposit indicates balanced recoveries between 97.5% and 61.2% and averaging 82.5%.

Results on samples taken from selected drillholes at the Boin, Nyamebekyere, and Sewum deposits indicate a strong correlation with zone.

- Boin (with a total of three samples) was highly oxidized and shows consistently good recoveries between 75.15% and 92.96% with the highest average of 86.98%.
- Nyamebekyere (with a total of five samples) was slightly oxidized and shows good to moderate recoveries between 50.56% and 82.73%, averaging 70.05%.
- Sewum (with a total of nine samples) was vaguely oxidized and shows variable but poor recoveries between 1.10% and 66.67%, averaging 18.73%.

Also, per the report, there may be a moderate correlation with grade as higher gold grade samples tend to show higher recoveries, and there is little to no correlation with depth and weathering intensity.

These initial bottle roll tests show that cyanide leaching is a viable option for the extraction of gold from the oxide domains. Further work on the physical constraints associated with heap leaching is still required to definitively select heap leaching as the best technical process option. For the purposes of this study, heap leaching has been selected as the preferred process option. A conservative overall gold recovery of 75% was used to develop a process design criteria for the purpose of the project PEA and is consistent with typical heap leaching operations of similar type of mineralization.

Gold recovery involving leach tests are typically sensitive to crush size. Generally, the gold recovery will increase with decreasing crush size but with associated higher operating costs and potential heap permeability issues. The particle size range was not recorded during the initial bottle roll tests, although a conventional P_{80} crush size to about 25 mm has been assumed as the heap leach process option for the purpose of the project PEA. Similarly heap height, solution application rates, reagent concentration, and other variables will all affect the final recovery and design. Data for these variables are based on other similar operations and still need to be confirmed for the Project.

14 MINERAL RESOURCE ESTIMATES

WSP completed a resource estimation of the Enchi Project. The resource has an effective date of March 17, 2014.

The resource update was completed on the Nyamebekyere and Sewum Zones with the 2012 drilling. No new drilling was completed on the Boin Zone. The information related to the Boin resource is sourced from the previous technical report (McCracken, 2012).

14.1 DATABASE

Edgewater maintains all borehole data in a Microsoft Access™ database. Header, survey, assays, and lithology tables are saved on individual tabs in the database. Individual Excel files exported from the database were provided to WSP by Edgewater on March 17, 2014.

The Project database contains a total of 963 boreholes and trenches with 63,568 assays records. On the Project, 88% of the drilling occurring within the Boin, Nyamebekyere and Sewum Zones. Table 14.1 summarizes the borehole database.

Table 14.1 Enchi Drillhole Database

Zone	Hole Type	No of Holes	Total Metres	Project %
Boin	Diamond Drill	62	7,567	9
	RC	131	14,795	17
	RAB	275	9,338	11
	Trench	64	5,719	7
Nyamebekyere	Diamond Drill	47	5,133	6
	RC	15	2,186	3
	RAB	-	-	0
	Trench	18	1,303	2
Sewum	Diamond Drill	68	9,787	12
	RC	57	7,144	8
	RAB	44	3,105	4
	Trench	88	8,482	10
Other Zones		94	10,194	12
Project Total		**963**	**84,753**	**100%**

The non-assayed intervals within the database were assigned a void (-) value. WSP believes that non-assayed material should not be assigned a zero value, as this does not reflect the true value of the material. Sample intervals with values below detection limit (<) in the database were assigned the detection limit.

The resource estimation was conducted using Surpac™ (v. 6.6)

14.2 SPECIFIC GRAVITY

WSP used a Specific Gravity (SG) of 2.45 for the resource estimate. This value is based on the average between the SG for transition zone material at the Chirano Mine and Asanko Gold's Esaase Project. Chirano and Asanko were selected as suitable analogies because these projects occur in the similar rock types, along the same regional structure, in the same country. The Chirano Mine is located 70 km north along strike of the Enchi project with Esaase found further along strike past Chirano.

Typically, the weathered material could have a slight lower SG, while fresh material would typically have a SG of 2.75 to 2.78. It was determined at this stage of the Project that a global SG would be appropriate. The use of assumed SG from the region is acceptable practice in the absence of data. The absence of SG data is a contributing factor in the determination of the resource category.

WSP recommends that Pinecrest collect SG measurements based on the weathering profile (weathered, transition, and fresh) in order to build up the dataset.

At a minimum, 5% of the dataset should have SG measurements before an acceptable value can be determined.

14.3 TOPOGRAPHIC DATA

The topographic surface used in the resource estimate is digital terrain model (DTM) based on the collar coordinates of the drillhole and trenches at each zone. Additional data points were inserted to smooth out some of the major discrepancies in the DTM.

14.4 GEOLOGICAL INTERPRETATION

The original three-dimensional wireframe models of mineralization were developed in Datamine™ by Tetra Tech with approval of all shapes by Edgewater. WSP received the wireframes files from Edgewater and adjusted the wireframes to include the resent drilling.

The basic wireframe designs for each of the zones were based on design criteria that included a minimum downhole width of 2.0 m and a minimum grade of 0.3 g/t gold.

Sectional interpretations used Surpac (v. 6.6) software and these interpretations were linked with tag strings and triangulated to build 3D solids. The solids were validated in Surpac™ and no errors were found.

The zones of mineralization interpreted for each area were generally contiguous; however, due to the nature of the mineralization there are portions of the wireframe that have grades less than 0.3 g/t gold, yet are still within the mineralizing trend.

Table 14.2 summarizes the basic parameters of the various mineral wireframes used in this resource estimate.

Table 14.2 Enchi Wireframe Statistics

	Zone	Minimum X	Maximum X	Minimum Y	Maximum Y	Minimum Z	Maximum Z	Volume (m^3)
11	Boin	518405	520686	632820	635874	-97	161	48,808,920
21	Nyamebekyere	530110	531068	637206	638815	-128	157	9,021,493
22	Nyamebekyere	530143	530850	637194	638353	-58	157	950,188
23	Nyamebekyere	530153	530927	637204	638441	-36	158	1,362,683
24	Nyamebekyere	530093	530250	637228	637401	-76	141	428,997
31	Sewum South	520017	520785	625748	626610	-49	128	1,025,848
32	Sewum Checker	521120	521515	627578	627910	-94	190	12,462,768
33	Sewum Road	520915	521157	629017	629281	-12	168	3,927,414
34	Sewum Hill	520968	521888	628580	630013	-1	266	28,302,440

14.5 EXPLORATORY DATA ANALYSIS

14.5.1 ASSAYS

The portion of the deposit included in the mineral resource was sampled by 16,784 gold assays. The assay intervals within each zone were flagged within the database. These borehole files were reviewed to ensure all the proper assay intervals were captured. Table 14.3 summarizes the basic statistics for the assays at Enchi as a whole and for each of the three zones individually.

Table 14.3 Enchi Drill Statistics by Zones

Zone	Samples	Length (m)			Gold (g/t)			
		Min	Max	Mean	Min	Max	Mean	Standard Deviation
Nyam	2634	0.5	2.0	1.0	0.010	44.200	0.355	1.199
Boin	9326	0.1	30.0	1.1	0.001	17.613	0.373	1.004
Sewum	4824	0.1	6.0	1.0	0.005	30.600	0.429	0.970

14.5.2 GRADE CAPPING

Raw gold assay was examined individually to assess the amount of metal that is at risk from high-grade assays. Cumulative frequency plots were used to assist in the determination if grade capping was required along with reviewing the 3D spatial distribution of the samples.

It was determined through the review, that only three samples representing less than 1% of the dataset should be capped at 18 g/t gold in order to restrict the local influence of these samples. The potential for smearing high-grade samples elsewhere within the deposits would be controlled by the kriging process.

14.5.3 COMPOSITING

Compositing of Boin assay data was completed on interval lengths of 1 m honoring the interpretation of the geological solids. Nyamebekyere and Sewum assay data was composited on 2 m intervals honoring the geological interpretation.

The 2 m composite for Nyamebekyere and Sewum was selected with the knowledge that the presumed mining method of the deposits would be open pit and thus large mining unit for the block size. Boin was composited on 1 m intervals, as it is the most abundant sample interval.

The process was used in the compositing routine to ensure all captured sample material was included. The routine adjusts the composite lengths for each individual borehole in order to compensate for the last sample interval. The minimum composite length was set at 0.75 m to ensure the backstitching process did not make sample too small. Table 14.4 summarizes the statistics for the boreholes after compositing.

Table 14.4 Enchi Composited Drill Data Statistics

Zone	Samples	Length (m)			Gold (g/t)			
		Min	Max	Mean	Min	Max	Mean	Standard deviation
Nyam	1,058	0.3	2.0	1.9	0.005	14.800	0.485	0.883
Boin	9,722	0.8	1.1	1.0	0.005	17.613	0.370	0.992
Sewum	2,962	1.5	2.2	2.0	0.005	18.000	0.440	0.780

14.6 SPATIAL ANALYSIS

Variography, using Surpac (v.6.6) software, was completed for gold within Nyamebekyere and Sewum, while the 2012 Boin resource used Datamine software. Downhole variograms were used to determine nugget effect and then correlograms were modeled to determine spatial continuity in the zones. The Nyamebekyere and Sewum variograms were normalized, while the 2012 Boin variogram was not normalized.

Table 14.5 summarizes results of the variography. Figures 14.1 to 14.4 are the variograms for Nyamebekyere and Sewum respectively. The variogram used in 2012 on the Boin Zone was a global variogram and includes data from Nyamebekyere and Sewum (Figure 14.5).

Table 14.5 Enchi Variogram Parameters

Wireframe	Model Type	Nugget	Number of Structure	Sill	Range
Nyamebekyere	Spherical	0.698889	2	0.13537	3.501
				0.166458	18.364
Boin	Spherical	0.300000	2	0.026	13
				0.871	50
Sewum	Spherical	0.306936	2	0.193955	2.514
				0.491753	96.942

Figure 14.1 Nyamebekyere Downhole Variogram

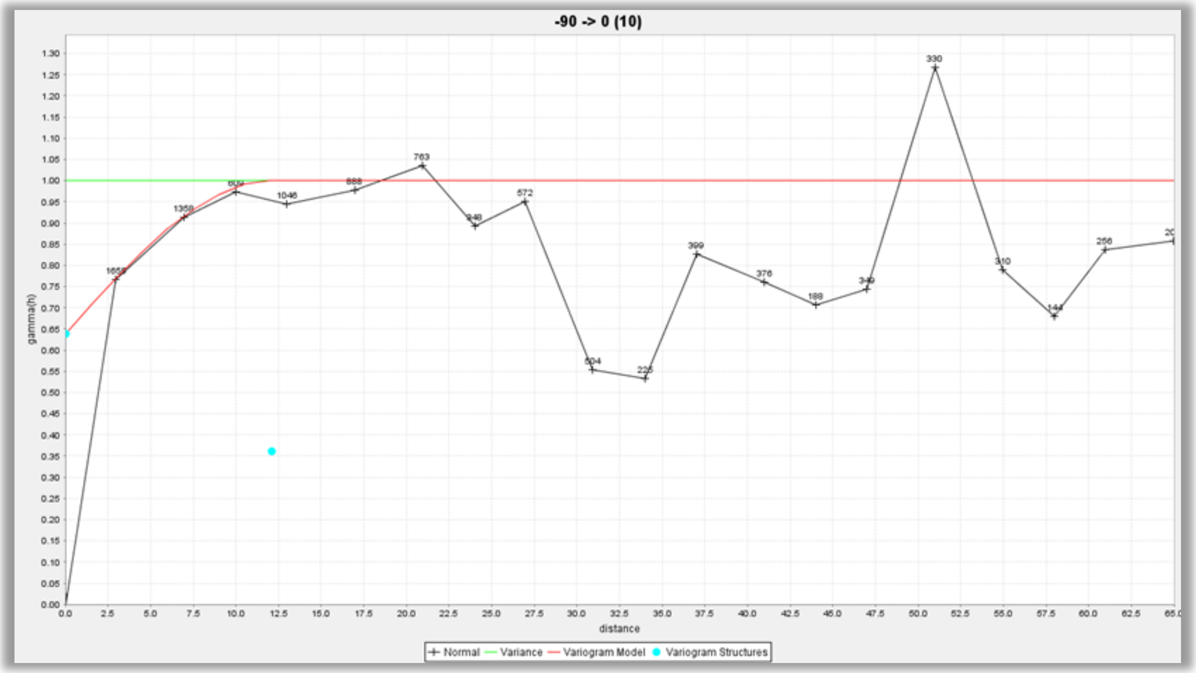


Figure 14.2 Nyamebekyere Variogram

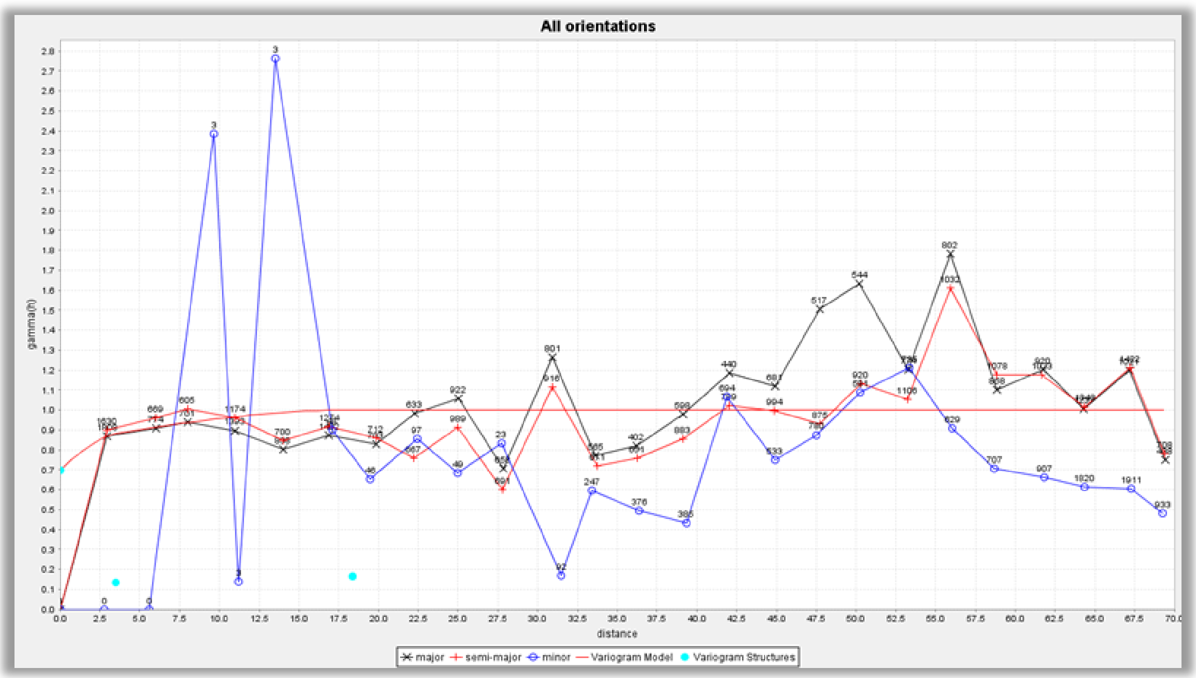


Figure 14.3 Sewum Downhole Variogram

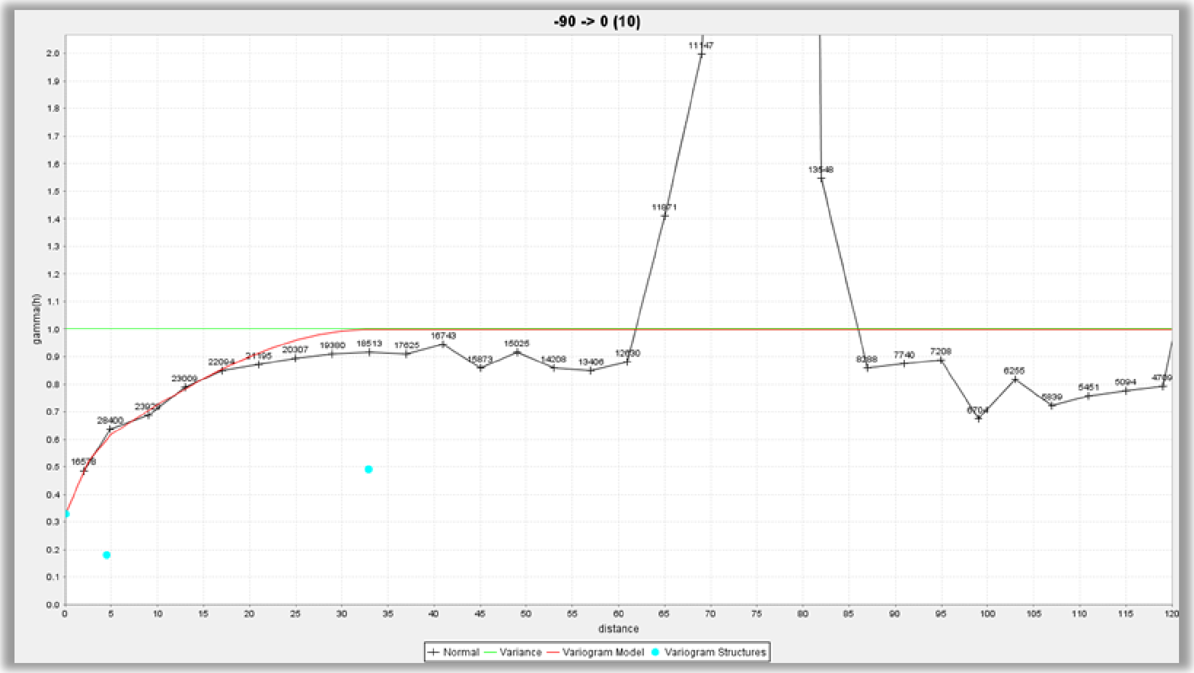


Figure 14.4 Sewum Variogram

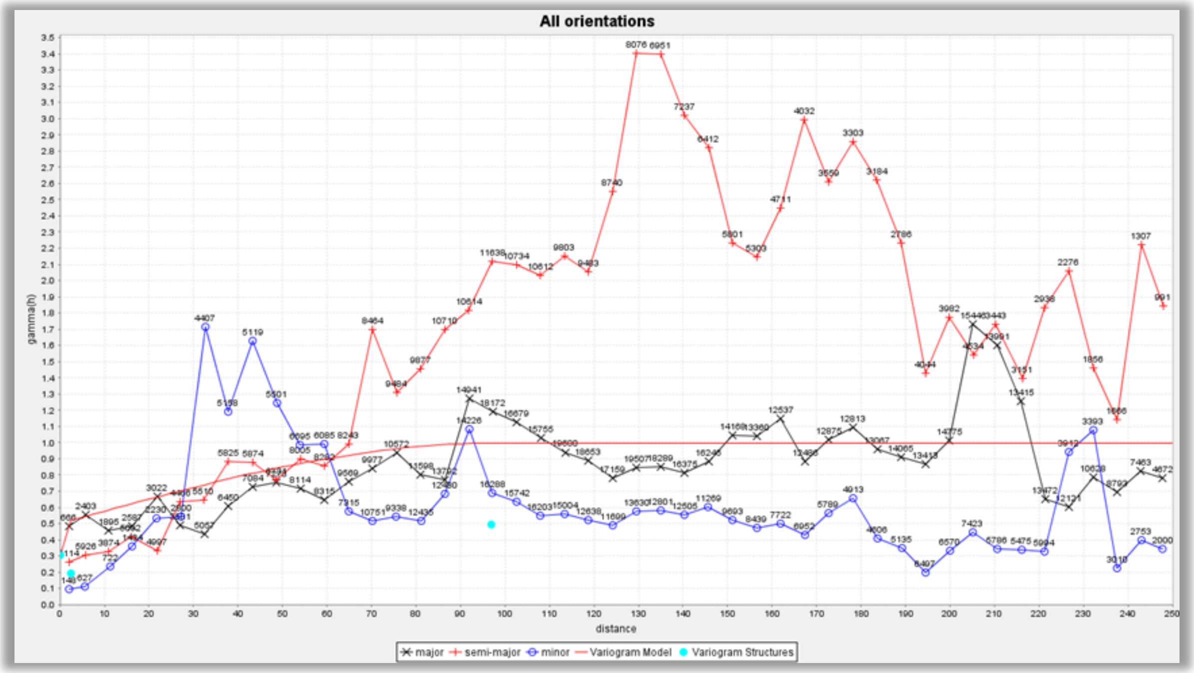
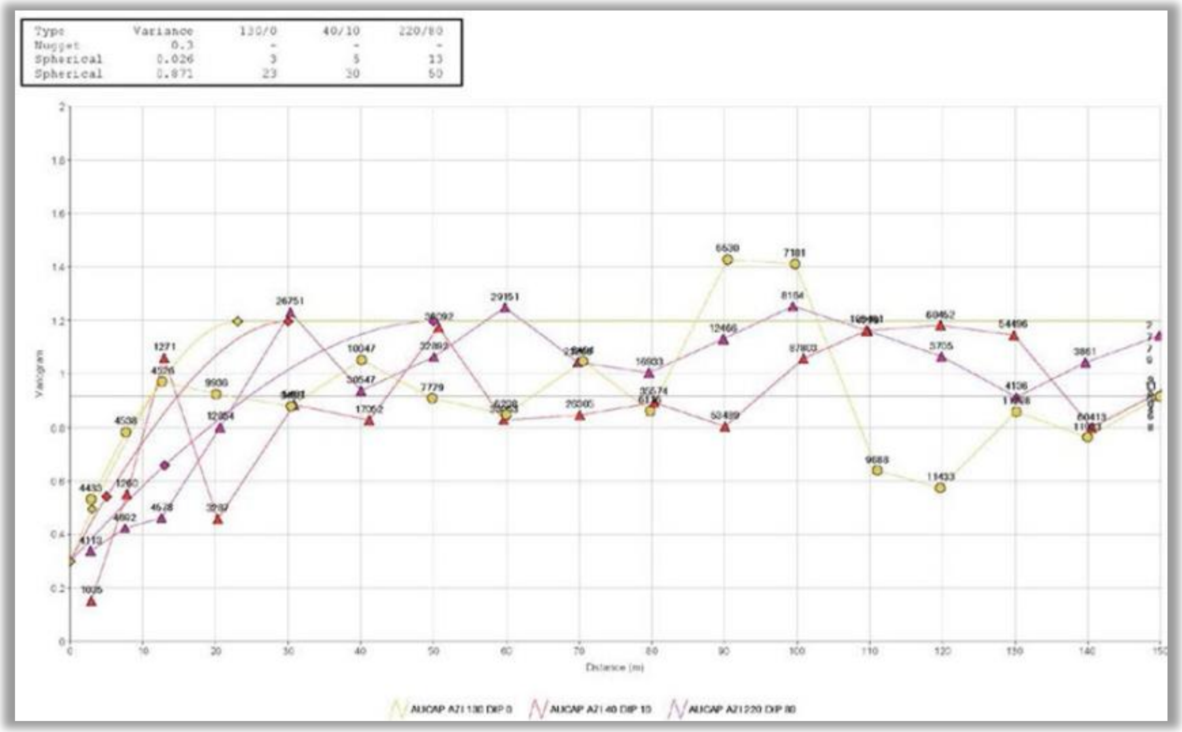


Figure 14.5 Boin Variogram



14.7 RESOURCE BLOCK MODEL

Individual block models were established in Surpac for each of the zones using one parent model as the origin. The model was not rotated. Drillhole spacing is variable with the majority of the surface drilling spaced at 25 m sections and 25 to 75 m on sections. A block size of 10 m x 10 m x 10 m was selected in order to accommodate the nature of the mineralization and be amenable for the open pit potential.

The block model was sub-celled on a 1.25 m x 1.25 m x 1.25 m pattern in the YZ plane allowing the parent block to be split in each direction to more accurately fill the volume of the wireframes, thus more accurately estimation of the tonnes in the resource.

Table 14.6 summarizes details of the parent block model.

Table 14.6 Enchi Parent Model

	Origin			Cell Size			Number of Cells		
Zone	X Origin	Y Origin	Z Origin	X	Y	Z	NX	NY	NZ
Nyamebekyere	529560	635280	-200	10	10	10	368	447	50
Boin	518000	625400	-150	10	10	10	1340	1400	60
Sewum	520040	625770	-55	10	10	10	180	420	25

14.7.1 ESTIMATION PARAMETERS

The interpolations of the zones were completed using the estimation methods: NN, ID^2, and OK. The estimations were designed for three passes. In each pass a minimum and maximum number of samples were required as well as a maximum number of samples from a borehole in order to satisfy the estimation criteria. Upon completion of the estimations, a global SG field was applied.

Tables 14.7 and 14.8 summarize the interpolation criteria for the zones.

Table 14.7 Boin Estimation and Search Parameters

Parameter	Value
Across Strike	23
Along Strike	30
Down Dip	50
Z-Rotation	40
Y-Rotation	-65
X-Rotation	10
Svolfac1	1
Min Samples	5
Max Samples	30
Svolfac2	3
Min Samples	5
Max Samples	30
Min. No. of Octants	2
Min / Octant	1
Max / Octant	15
Max Key	15

Table 14.8 Nyamebekyere Sewum Estimation and Search Parameters

		Nyamebekyere	Sewum 1,2,3	Sewum 4
Angles of Rotation	First Axis	115.23	34	19.3
	Second Axis	0	0	0
	Third Axis	-85.02	78	40
Anisotropy Factors	Major/Semi Major	1.67	1.44	1.44
	Major/Minor	2.09	3.29	3.29
Interpolation Parameters	Max Search	100	180	180
	Max Vertical Search	999	999	999
	Min Number Samples	4	5	5
	Max Number Samples	7	15	15
	Max Key	5	5	5

14.8 RESOURCE CLASSIFICATION

Several factors are considered in the definition of a resource classification:

- NI 43-101 requirements;
- Canadian Institute of Mining, Metallurgy and Petroleum (CIM) guidelines;
- Author's experience with shear-hosted gold deposits and in particular the Enchi project;
- Spatial continuity based on variography of the assays within the drillholes;
- Drillhole spacing and estimation runs required to estimate the grades in a block;
- The uncertainty in the drillhole collar elevations.

No environmental, permitting, legal, title, taxation, socio-economic, marketing, or other relevant issues are known to WSP that may affect the estimate of mineral resources. Mineral reserves can be estimated only on the basis of an economic evaluation that is used in a preliminary feasibility study or a feasibility study of a mineral project; thus, no reserves have been estimated. As per NI 43-101, mineral resources, which are not mineral reserves, do not have to demonstrate economic viability.

14.9 MINERAL RESOURCE TABULATION

The resource estimate, effective as of March 2014, has been tabulated in terms of a gold cut-off grade. The mineral resource classification for each of the zones at Enchi is tabulated in Tables 14.9 to 14.11 for the Inferred Resources. Resources are stated as all blocks above the cut-off grade.

Table 14.9 Boin Cut-Off Table

Au OK Cut-Off	Tonnes	Au (g/t)	Contained Gold (ounces)
0.2	40,969,000	0.57	750,806
0.3	29,345,000	0.70	660,435
0.4	21,616,000	0.82	569,885
0.5	15,872,000	0.96	489,892
0.6	12,139,000	1.08	421,507
0.7	9,551,000	1.20	368,492
0.8	7,875,000	1.30	329,148
0.9	6,778,000	1.37	298,552
1.0	5,695,000	1.46	267,328
1.1	4,682,000	1.54	231,819
1.2	3,510,000	1.67	188,461
1.3	2,824,000	1.78	161,615
1.4	2,195,000	1.90	134,087
1.5	1,635,000	2.05	107,763
1.6	1,327,000	2.17	92,582
1.7	1,138,000	2.26	82,689
1.8	966,000	2.35	72,987
1.9	814,000	2.44	63,858
2.0	706,000	2.52	57,201

Table 14.10 Nyamebekyere Cut-Off Table

Au OK Cut-Off	Tonnes	Au (g/t)	Contained Gold (ounces)
0.2	11,261,000	0.63	228,095
0.3	8,537,000	0.75	205,856
0.4	6,925,000	0.84	187,024
0.5	5,350,000	0.96	165,129
0.6	4,412,000	1.05	148,944
0.7	3,716,000	1.13	135,006
0.8	3,085,000	1.20	119,024
0.9	2,579,000	1.27	105,306
1.0	2,001,000	1.36	87,495
1.1	1,482,000	1.47	70,043
1.2	1,178,000	1.55	58,705
1.3	852,000	1.67	45,746
1.4	570,000	1.82	33,354
1.5	377,000	2.02	24,484
1.6	287,000	2.19	20,208
1.7	221,000	2.33	16,556
1.8	186,000	2.44	14,592
1.9	176,000	2.47	13,977
2.0	157,000	2.53	12,771

Table 14.11 Sewum Cut-Off Table

Au OK Cut-Off	Tonnes	Au (g/t)	Contained Gold (ounces)
0.2	45,691,000	0.51	747,887
0.3	34,729,000	0.59	659,779
0.4	24,825,000	0.69	548,007
0.5	16,135,000	0.82	423,676
0.6	10,577,000	0.96	327,184
0.7	7,549,000	1.09	264,481
0.8	5,118,000	1.25	206,170
0.9	3,636,000	1.42	166,004
1.0	2,431,000	1.66	129,551
1.1	2,170,000	1.73	120,745
1.2	1,758,000	1.87	105,602
1.3	1,502,000	1.97	95,347
1.4	1,321,000	2.06	87,528
1.5	999,000	2.25	72,310
1.6	904,000	2.32	67,542
1.7	682,000	2.54	55,760
1.8	623,000	2.62	52,418
1.9	564,000	2.70	48,882
2.0	311,000	3.29	32,942

The corresponding grade-tonnage curve for the inferred resource is displayed on Figures 14.6 to 14.8.

Figure 14.6 Boin Grade-Tonnage Curve

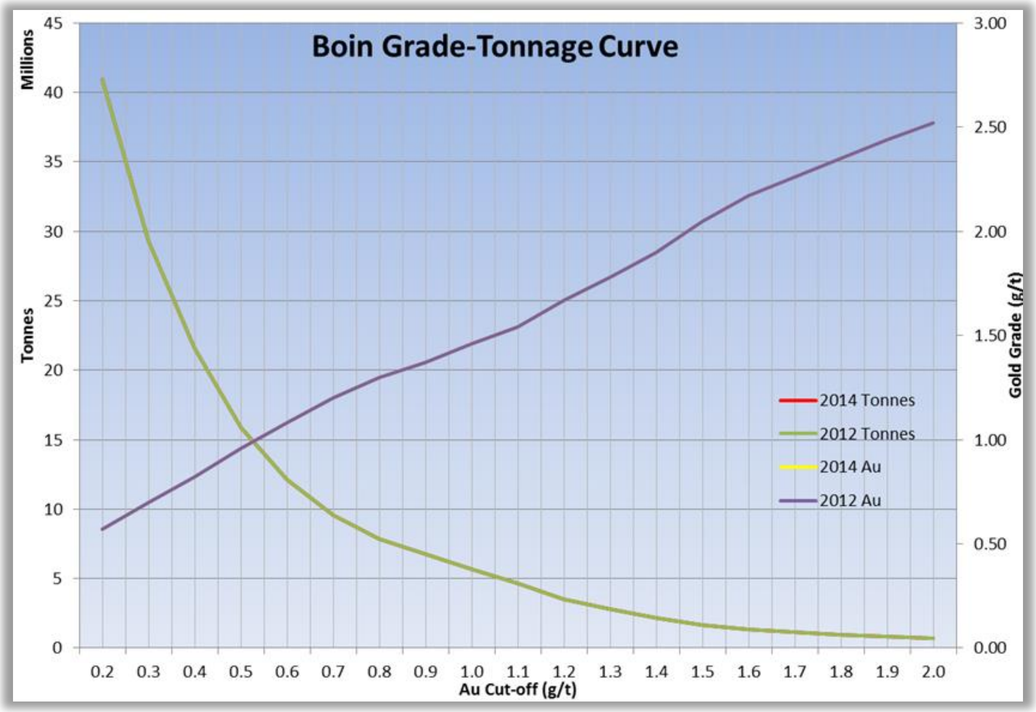


Figure 14.7 Nyamebekyere Grade-Tonnage Curve

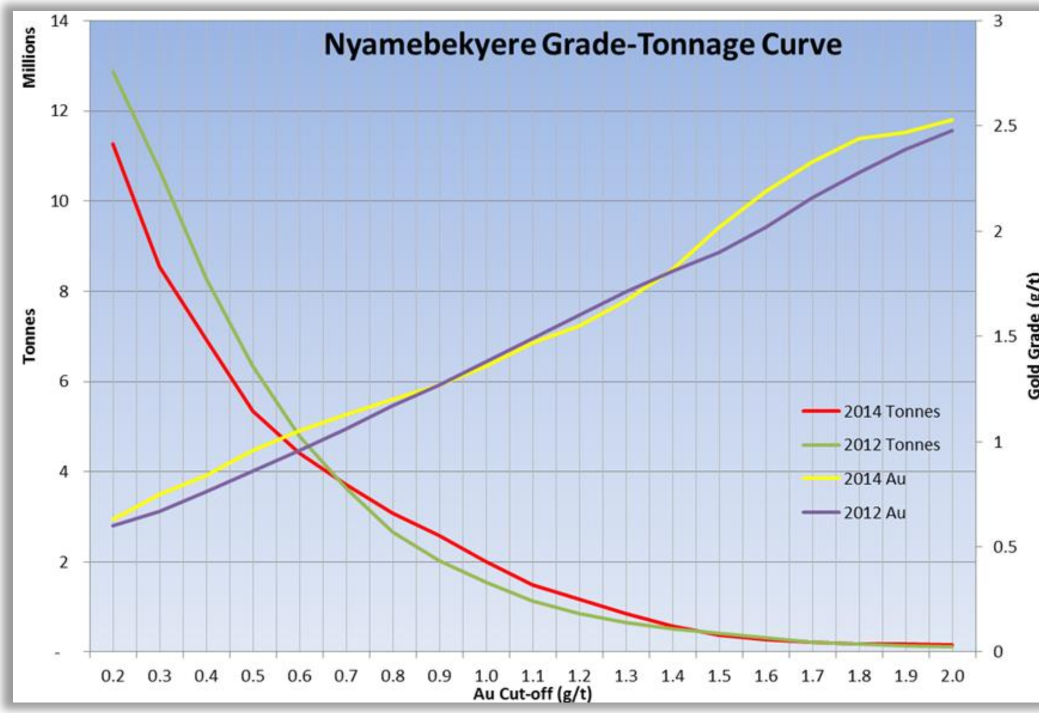
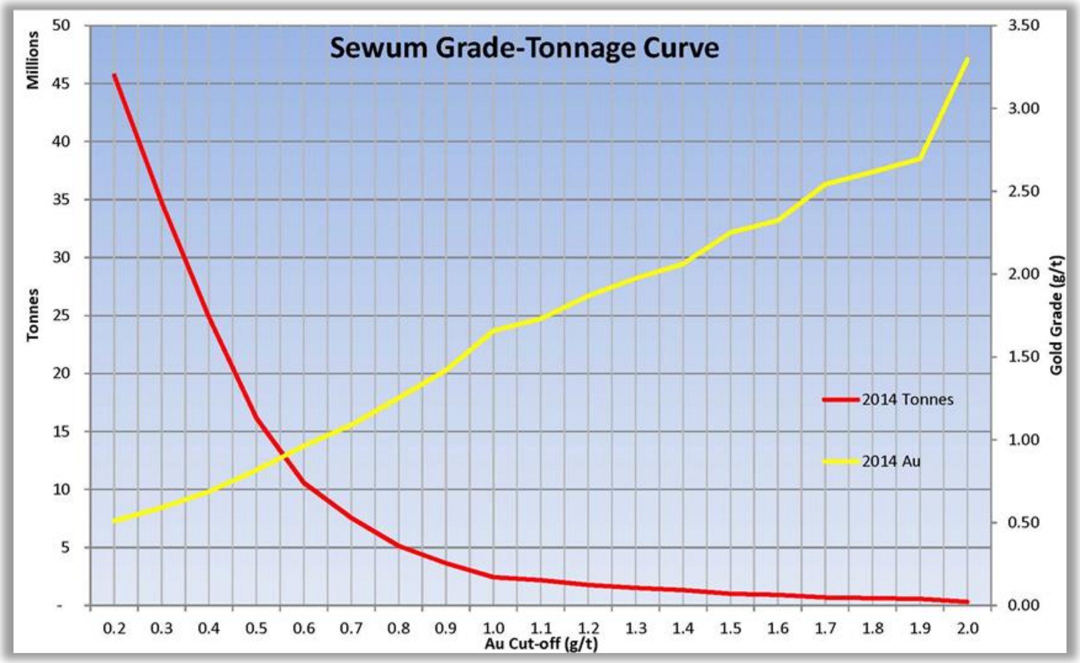


Figure 14.8 Sewum Grade-Tonnage Curve



Based on the following assumptions, a 0.5 g/t gold cut-off was deemed suitable for this Enchi resource:

- $1,300.per ounce gold price.
- $20/tonne open pit mining and heap leach extraction based on a 2 to 3 Mtpy production rate.
- Resource material is restricted to the geological domains used to generate the estimate.
- Resources do not exceed 150 m vertical depth, well within the limits of a conceptual open pit.
- The cut-off grade is comparable to open pit operations in Ghana, such as Kinross's Chirano Mine and Endeavour Mining's Nzema Mine:
  - both mines currently operate open pits in Ghana with a mix of oxide and un-oxidized material;
  - both mines operate heap leach pads for the oxide component of the mine feed;
  - production rates of 3 Mtpy or more were used at Chirano and are currently used at Nzema;
  - Chirano's open pits operated with a 0.6 g/t Au cut-off when gold was at US$550 to US$700 per ounce. Chirano now operates as an underground mine, with small satellite open pits to sublimate mill feed (www.kinross.com);
  - Chirano is located 70 km north-east along strike of the Enchi Project on the Bibiani Shear;
  - Nzema's open pit currently operates with a 0.5 g/t au cut-off (www.Endeavourmining.com).

Table 14.12 is a summary of the un-constrained resource estimate.

Table 14.12 Enchi Resource Summary

Category	Cut-Off (g/t)	Zone	Tonnes	Grade Au (g/t)	Contained Gold (ounces)
Inferred	0.5	Boin	15,872,000	0.96	489,892
Inferred	0.5	Nyamebekyere	5,350,000	0.96	165,129
Inferred	0.5	Sewum	16,135,000	0.82	423,676
Inferred	0.5	Total	37,357,000	0.90	1,078,697

14.10 VALIDATION

The Enchi model was validated by three methods:

- Visual comparison of colour-coded block model grades with composite grades on section and plan.
- Comparison of the global mean block grades for OK, ID2, NN, and composites.
- Swath plots of the various zones in both plan and section views.

14.10.1 VISUAL VALIDATION

The visual comparisons of the block model grades with composite grades for each of the zones show a reasonable correlation between the values. No significant discrepancies were apparent from the sections reviewed, yet grade smoothing is apparent in some locations due to the distance between drill samples being broader in some regions.

Figures 14.9 to 14.11 display the comparison between the block model and the composited drillholes. The colour-coded legend in the figures applies to both the drillholes and the resource blocks.

Figure 14.9 Boin Validation Sections

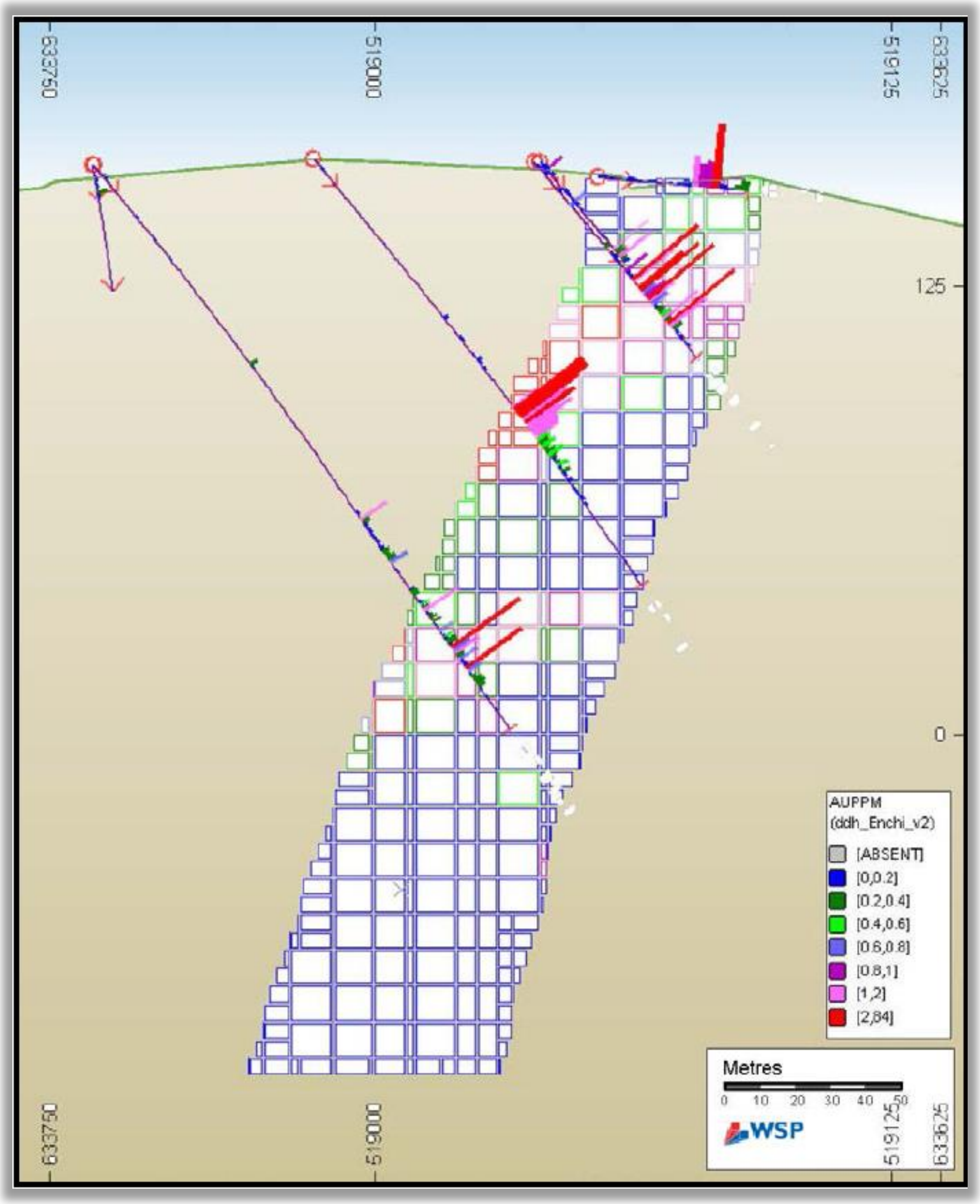


Figure 14.10 Sewum Validation Section

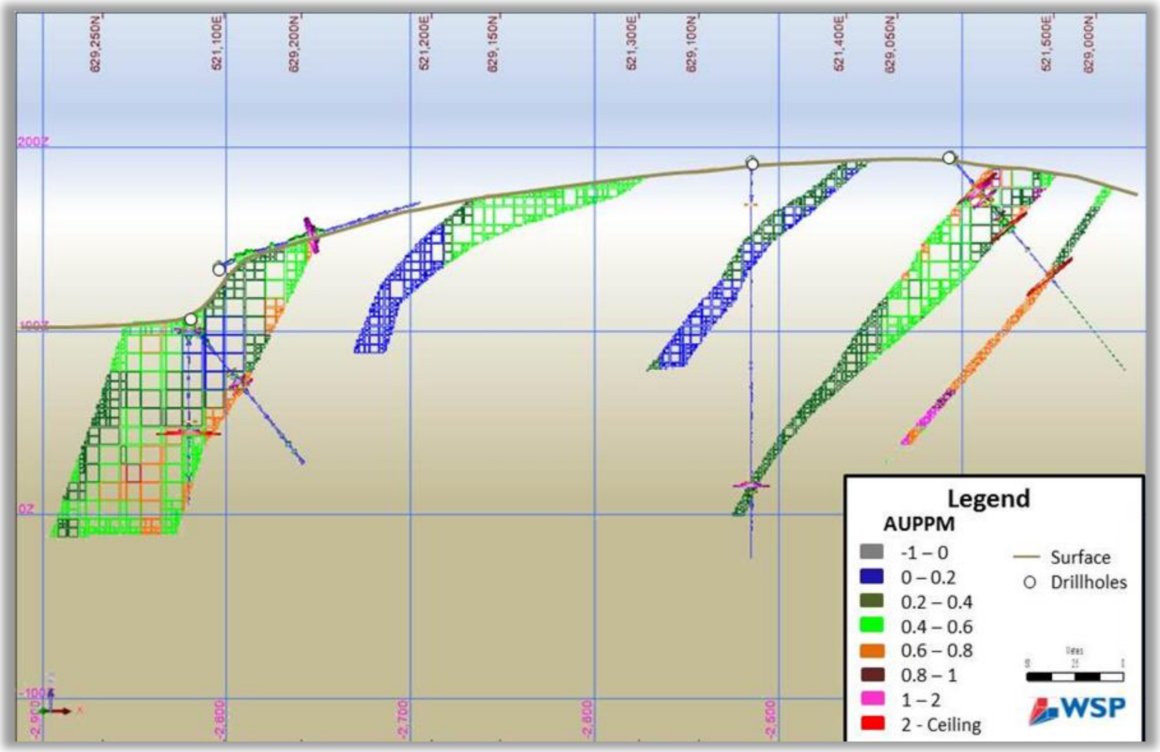
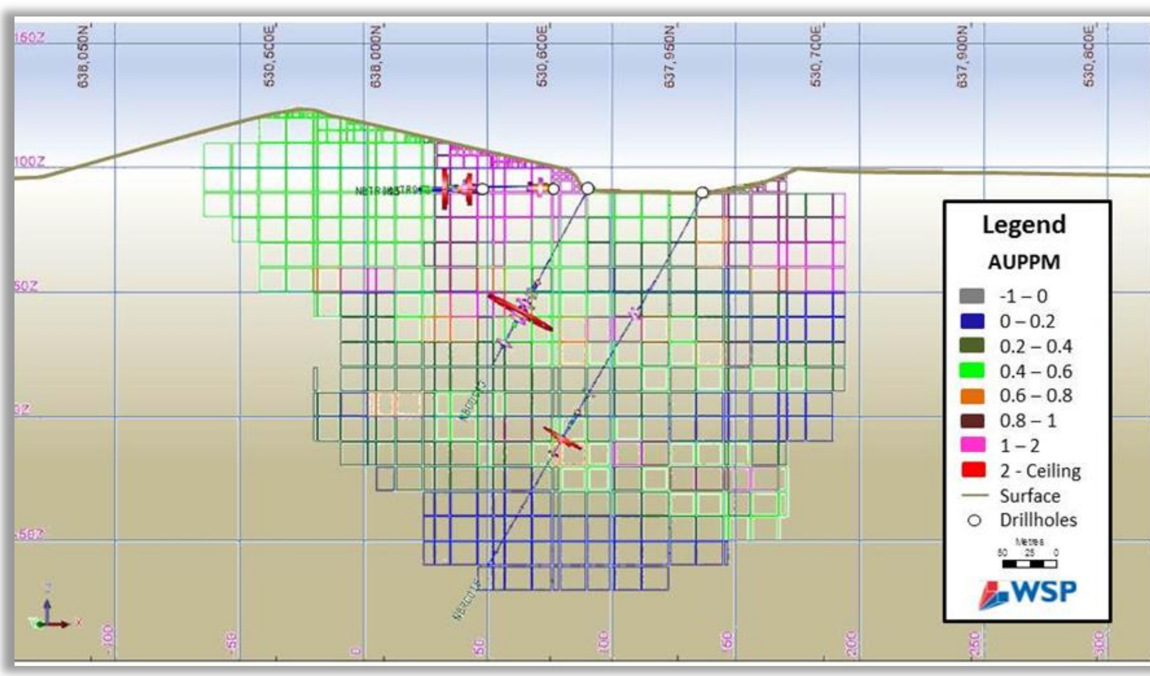


Figure 14.11 Nyamebekyere Validation Section



14.10.2 GLOBAL COMPARISON

The overall block model statistics for the OK model were compared to the overall ID^2 and NN model values as well as the composite capped drillhole data. Table 14.13 shows this comparison of the global estimates for the three estimation method calculations. In general, there is agreement between the OK model, ID^2 model, and NN model. Larger discrepancies are reflected as a result of lower drill density in some portions of the model. There is a degree of smoothing apparent when compared to the diamond drill statistics. Comparisons were made using all blocks at a 0 g/t cut-off.

Table 14.13 Global Statics Comparison

Zone	DDH	OK	ID	NN
Nyamebekyere	0.485	0.543	0.547	0.563
Boin	0.370	0.340	0.331	0.321
Sewum	0.440	0.475	0.497	0.625

14.10.3 SWATH PLOTS

Swath plots of northings and elevations were generated for each mineralized zone respectively. These plots are comparing the OK estimates with the NN and ID^2 estimates. The plots are illustrated on Figures 14.12 to 14.17.

Figure 14.12 Boin Cross Section Swath Plot

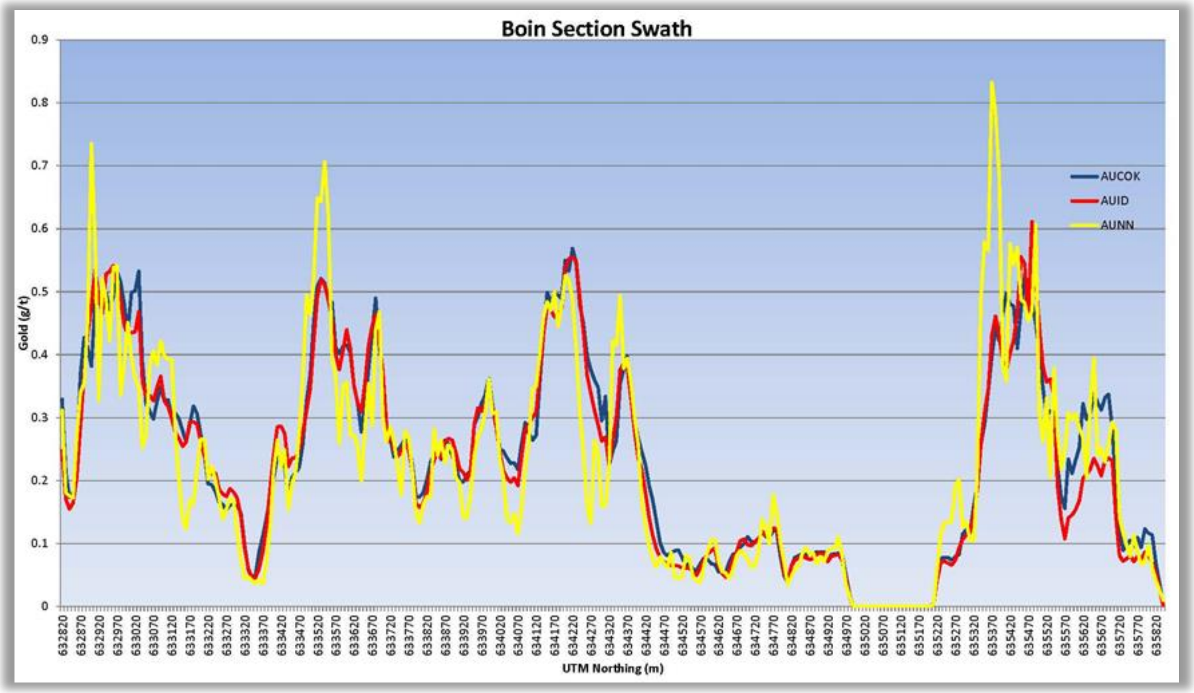


Figure 14.13 Boin Elevation Swath Plot

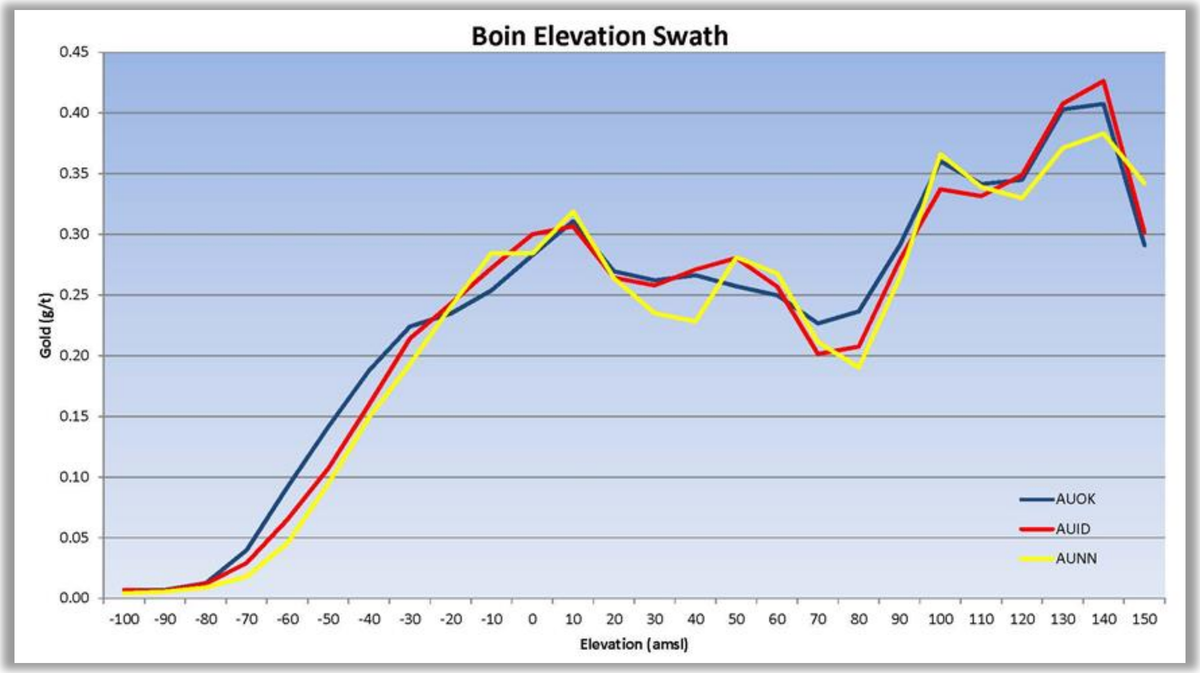


Figure 14.14 Nyamebekyere Cross Section Swath Plot

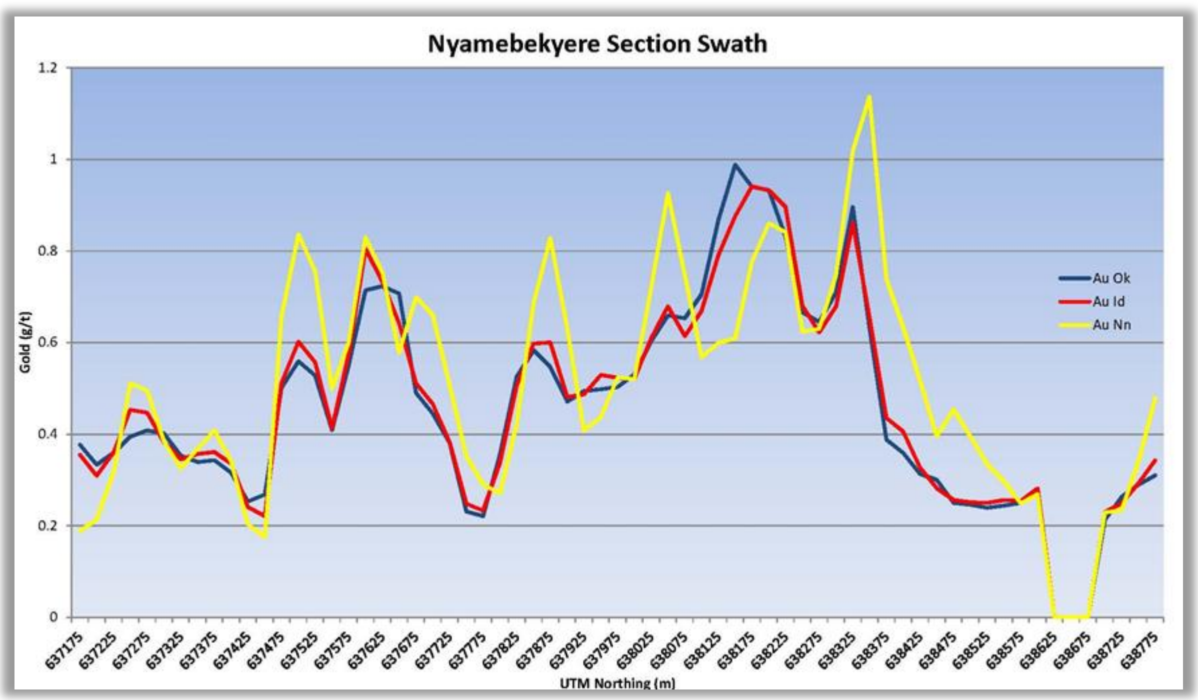


Figure 14.15 Nyamebekyere Elevation Swath Plot

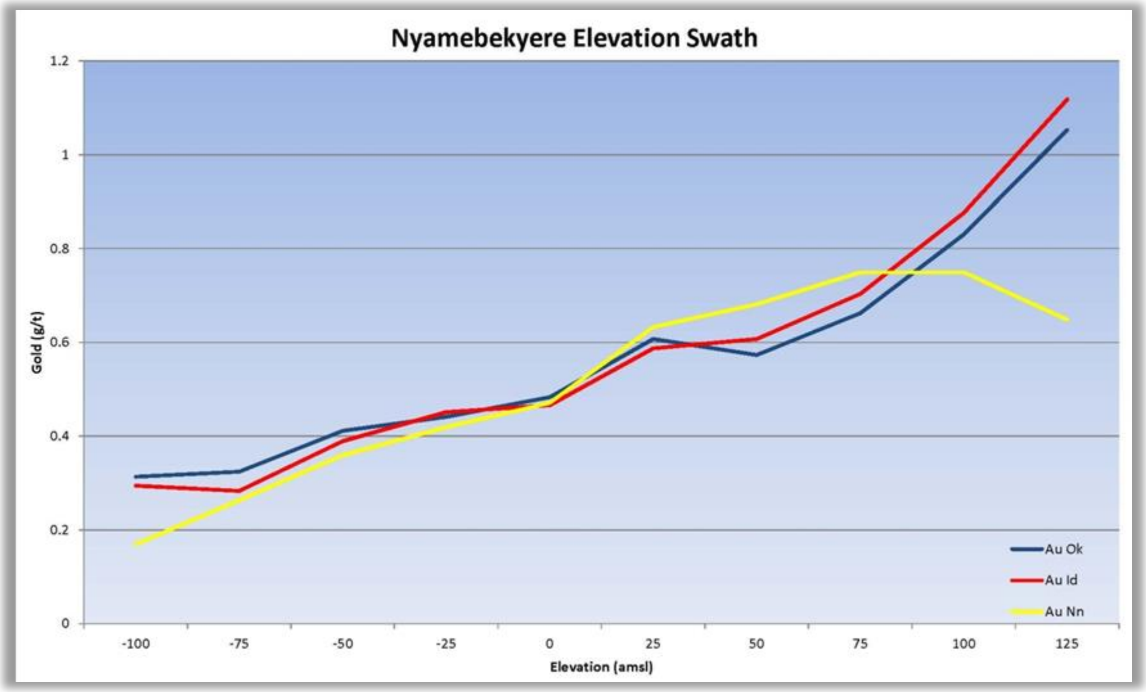


Figure 14.16 Sewum Cross Section Swath Plot

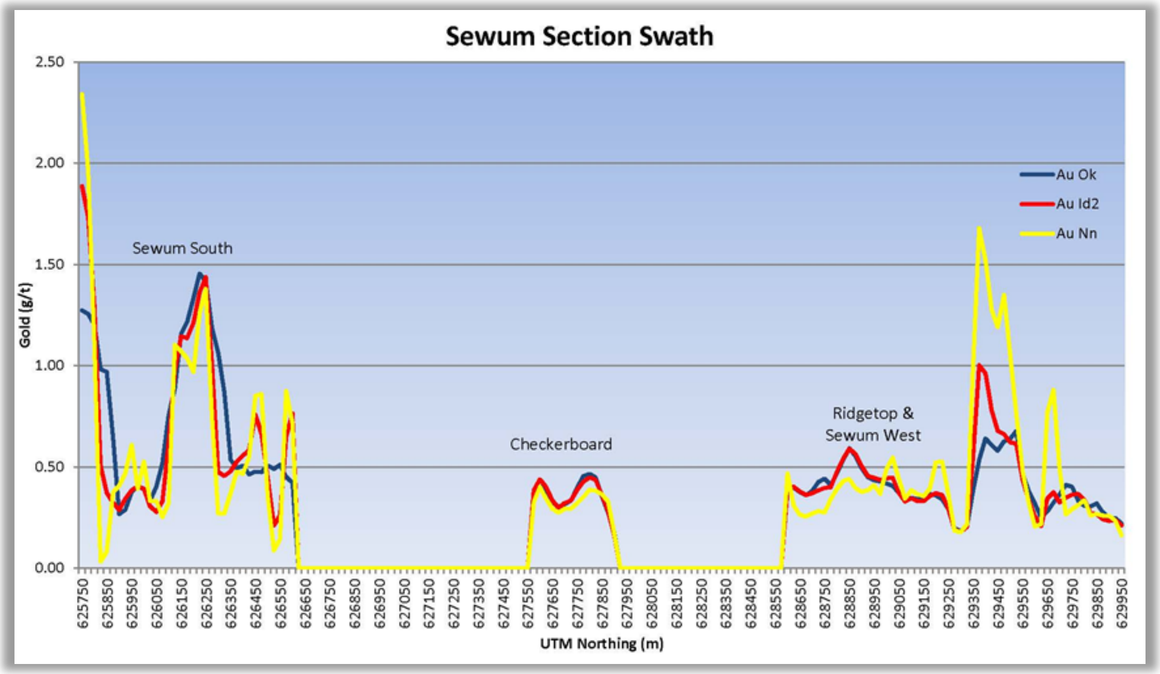
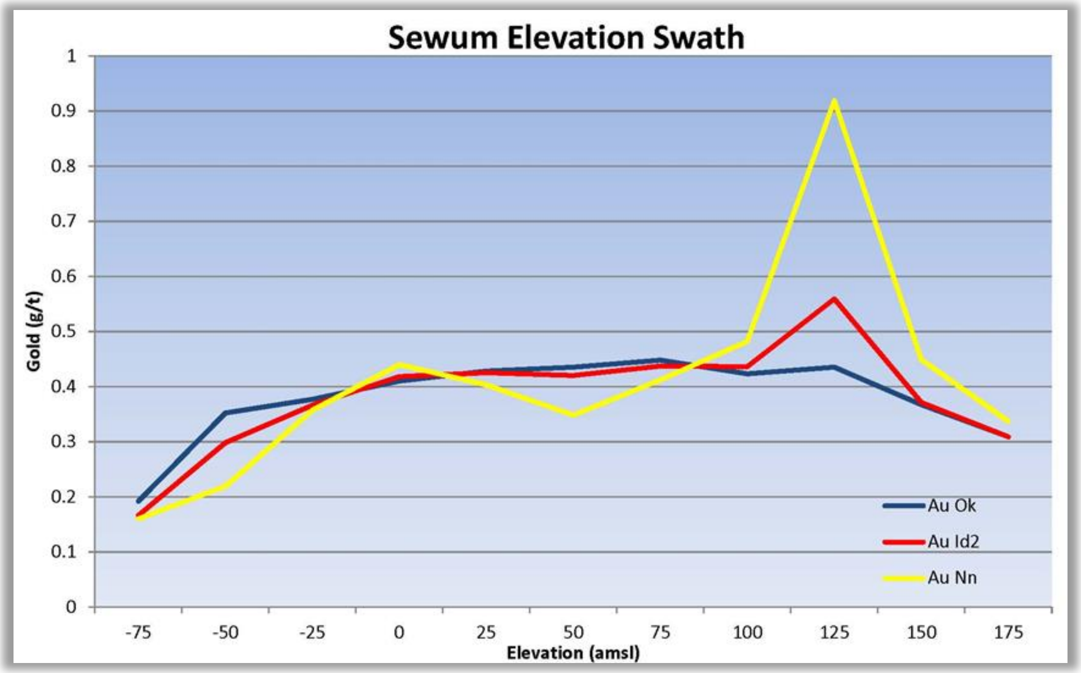


Figure 14.17 Sewum Elevation Swath Plot



14.11 PREVIOUS ESTIMATES

Edgewater commissioned Tetra Tech to generate a resource estimate in 2012 (McCracken 2012). That 2012 estimate was based on the premise that the resource could potentially be extracted using traditional open pit methods.

Table 14.14 illustrates the differences in the 2012 resource estimate with the current NI 43-101 compliant resource from 2014.

Table 14.14 Comparison with Previous Estimate

	2012 Tetra Tech Model	2014 WSP Model
Zone	**Boin**	
Tonnes	9,551,000	15,872,00
Au (g/t)	1.20	0.96
Zone	**Nyamebekyere**	
Tonnes	3,633,000	5,350,000
Au (g/t)	1.06	0.96
Zone	**Sewum**	
Tonnes	7,443,000	16,135,00
Au (g/t)	1.07	0.82
Zone	**Enchi Total**	
Tonnes	20,627,000	37,357,000
Au (g/t)	1.13	0.90

The difference between the 2012 resource model and the 2014 resource model is largely due to the lower cut-off grade being applied. The lower cut-off is based on the assumption of increased production rate which would result in an assumed lower operating cost ($20/tonne (2014) vs. $30/tonne (2012)).

There were slight changes to the Nyamebekyere and Sewum wireframes to include the latest drill results. The newest drilling increased the volumes the wireframes slightly and the drillhole contained assay results that were above the average grade of the zones. When comparing the two block models at the same cut-off grade of 0.7 g/t Au, these two minor adjustments resulted in a 1% increase in tonnage and a 1.7% increase in grade.

15 MINERAL RESERVE ESTIMATES

A Mineral Reserve is the economically mineable part of a Measured and/or Indicated Mineral Resource. It includes diluting materials and allowances for losses, which may occur when the material is mined or extracted and is defined by studies at Pre-feasibility or Feasibility level as appropriate that include application of Modifying Factors.

A Mineral Reserve has not been estimated for the Project as part of this PEA since the mineral resource is classified as Inferred.

16 MINING METHODS

This PEA is preliminary in nature. The mine plan presented in this section is based entirely on Inferred Mineral Resources. There is no certainty that this PEA, which is based on these Inferred Mineral Resources, will be realized.

The Project Mine Plan was developed using conventional truck-shovel open pit mining method. The mining rates considered in this PEA are a result of targeting to deliver 3 million tonnes per year of feed to the heap leach facility.

The Mine Plan presented includes mining from the Sewum, Boin, and Nyamebekyere deposits.

16.1 PIT LIMIT ANALYSIS

Economic mine limits were determined using Geovia's Whittle™ 4.5.5 software which uses the Lerch-Grossman (LG) algorithm. The LG algorithm progressively identifies economic blocks, taking into account waste stripping, that results in a highest possible total value mined within the open pit shell, subject to the specified pit slope constraints.

16.1.1 INPUT PARAMETERS

A 3D geological block model and other economical and operational variables are used as inputs into the software program. These variables include overall pit slope angle, mining costs, processing costs, selling costs, metal prices, and other variables listed in Table 16.1. These parameters were used to evaluate Sewum, Boin, and Nyamebekyere.

Table 16.1 Pit Optimization Parameters

Parameter	Units	Value
Process		Heap Leach
Process production rate	Mt/a	2 - 3
Mining dilution	%	5 – 9
Mining recovery	%	95
Overall slope angle	Degrees	
oxide		40
transitional		45
fresh		50
Mining cost	US$/$t_{mined}$	
oxide		1.70
transitional		2.05
fresh		2.15
Processing cost	US$/$t_{processed}$	8.00
Additional processing costs and G&A	US$/$t_{processed}$	2.25

Parameter	Units	Value
Metallurgical recovery	%	
oxide		75
transitional		75
fresh		73
Metal price	US$/oz	1300
Selling cost	% of Metal Price	5
Discount rate	%	8
Resource classifications used in optimization		Inferred

Mining Dilution and Mining Recovery

The geological block model for the Boin Deposit required regularization to 5 x 5 x 5 m block size in order to be imported into the optimization software. As a result of the regularization, 9% dilution was incorporated into the model. No additional dilution assumptions were applied within the optimization software.

For the Nyamebekyere and Sewum deposits, a default 5% dilution assumption was applied within the optimization software.

A default 95% mining recovery assumption was applied to the three deposits.

Overall Slope Angle

There was limited geotechnical data available at the time of analysis. Preliminary geotechnical parameters were derived by WSP for pit slopes on the basis of reviewing core logs (photos) geotechnical logs (RQD), and structural logs (lithology, weathering profiles, alteration, strength) of a limited number of drillholes from the Boin resource area and broad assumptions based on similar scale operations elsewhere.

Operating Costs

The operating costs are preliminary and are used for optimization purposes only. Detailed operating costs are developed based on a detailed mine design and plan and discussed in later sections.

Metallurgical Recovery

The assumptions for the metallurgical recoveries of oxide and transitional material are based on limited test work and recommendation from the WSP metallurgical QP. There has been no test work on fresh material type. It was assumed, based on experience that recoveries would be lower for fresh material compared to oxide material.

Metal Price

A selling price of 1,300 US$/oz Au was used for the pit limit analysis. At the time of the pit limit analysis, as of August 20 2014, the following average gold prices were observed, based on data from Kitco.com:

- Two-year Trailing Average: approximately 1,425 US$/oz.

- Three-year Trailing Average: approximately 1,504 US$/oz.
- Five-year Trailing Average: approximately 1,419 US$/oz.
- 12-month Trailing Average: approximately 1,297 US$/oz.
- Monthly Average Spot Price (to August 20 2014): 1,301 US$/oz.
- Daily PM spot price: 1,295 US$/oz.

Cut-Off Grade

To classify the material contained with the open pit limits as material for processing or material for waste, the milling cut-off grade is used. This break-even cut-off grade is calculated to cover the costs of processing, general and administrative costs, and selling costs using the economic and technical parameters listed in Table 16.1. Material contained within the pit and above the cut-off grade is classified as heap leach feed, while material below the cut-off grade is classified as waste.

The cut-off grade has been determined to be 0.37 g/t for Fresh Material and 0.36 g/t for Oxide and Transitional Material.

16.1.2 RESULTS

The optimization process results in a series of nested pit shells, each corresponding to a Revenue Factor (RF). The revenue factor scales the metal price only, and no costs are factored by the RF. The RF 1 corresponds to a metal price of 1300 US$/oz. Tables 16.2 to 16.4 summarize the pit shell results for each of the deposits at a selection of revenue factors.

Table 16.2 Nested Pit Shell Results, Boin Deposit

Revenue Factor	Total Rock (Mt)	Heap Leach Feed (Mt)	Waste (Mt)	Strip Ratio	Au Grade (g/t)
0.82	40.29	8.74	31.55	3.61	1.08
0.84	40.59	8.95	31.64	3.53	1.07
0.86	41.53	9.29	32.24	3.47	1.05
0.88	41.84	9.52	32.33	3.40	1.04
0.90	45.96	10.33	35.62	3.45	1.02
0.92	47.22	10.60	36.62	3.45	1.01
0.94	48.09	10.88	37.21	3.42	1.00
0.96	50.63	11.29	39.34	3.49	0.99
0.98	51.71	11.64	40.07	3.44	0.98
1.00	54.21	12.25	41.95	3.42	0.96

Table 16.3 Nested Pit Shell Results, Nyamebekyere Deposit

Revenue Factor	Total Rock (Mt)	Heap Leach Feed (Mt)	Waste (Mt)	Strip Ratio	Au Grade (g/t)
0.82	13.61	3.08	10.52	3.42	0.98
0.84	14.40	3.21	11.19	3.49	0.98
0.86	15.55	3.41	12.14	3.56	0.97
0.88	15.64	3.48	12.16	3.49	0.96
0.90	16.84	3.74	13.09	3.50	0.95

Revenue Factor	Total Rock (Mt)	Heap Leach Feed (Mt)	Waste (Mt)	Strip Ratio	Au Grade (g/t)
0.92	16.97	3.80	13.17	3.47	0.94
0.94	17.44	3.91	13.53	3.46	0.93
0.96	17.48	3.94	13.54	3.44	0.93
0.98	17.77	4.01	13.76	3.43	0.92
1.00	17.94	4.06	13.88	3.42	0.92

Table 16.4 Nested Pit Shell Results, Sewum Deposit

Revenue Factor	Total Rock (Mt)	Heap Leach Feed (Mt)	Waste (Mt)	Strip Ratio	Au Grade (g/t)
0.82	15.19	6.71	8.48	1.26	1.04
0.84	16.52	7.46	9.06	1.21	0.99
0.86	19.15	8.21	10.94	1.33	0.95
0.88	19.97	8.74	11.22	1.28	0.93
0.90	20.48	9.12	11.36	1.24	0.91
0.92	21.81	9.73	12.08	1.24	0.88
0.94	22.40	10.11	12.29	1.22	0.87
0.96	24.67	10.71	13.96	1.30	0.85
0.98	25.24	11.06	14.18	1.28	0.84
1.00	26.46	11.62	14.84	1.28	0.82

The resultant optimization generates a number of smaller, discrete pits at each deposit area instead of one continuous pit. Figures 16.1 to 16.4 show the RF1 pit shell results for each of the deposits.

Figure 16.1 Boin Pit Optimization, RF1 Pit Shell (3D View)

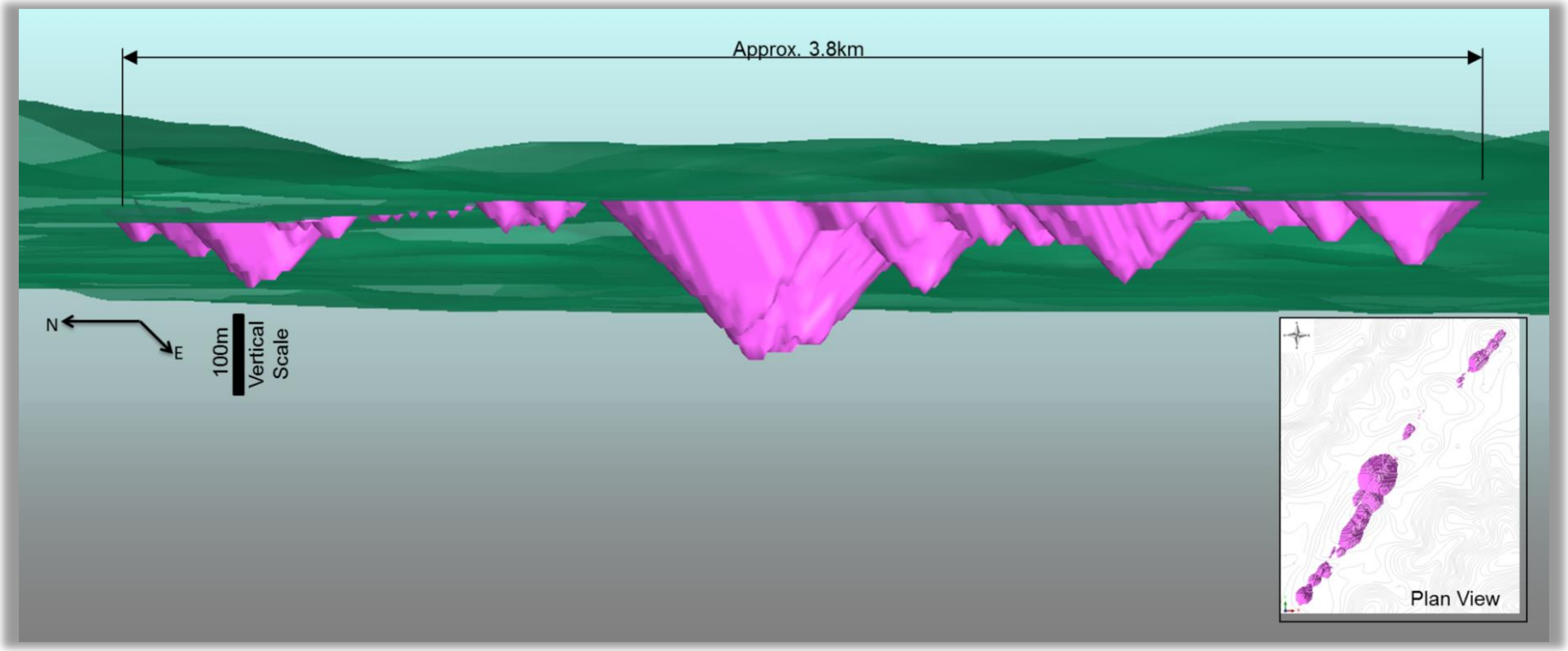


Figure 16.2 Nyamebekyere Pit Optimization, RF1 Pit Shell (3D View)

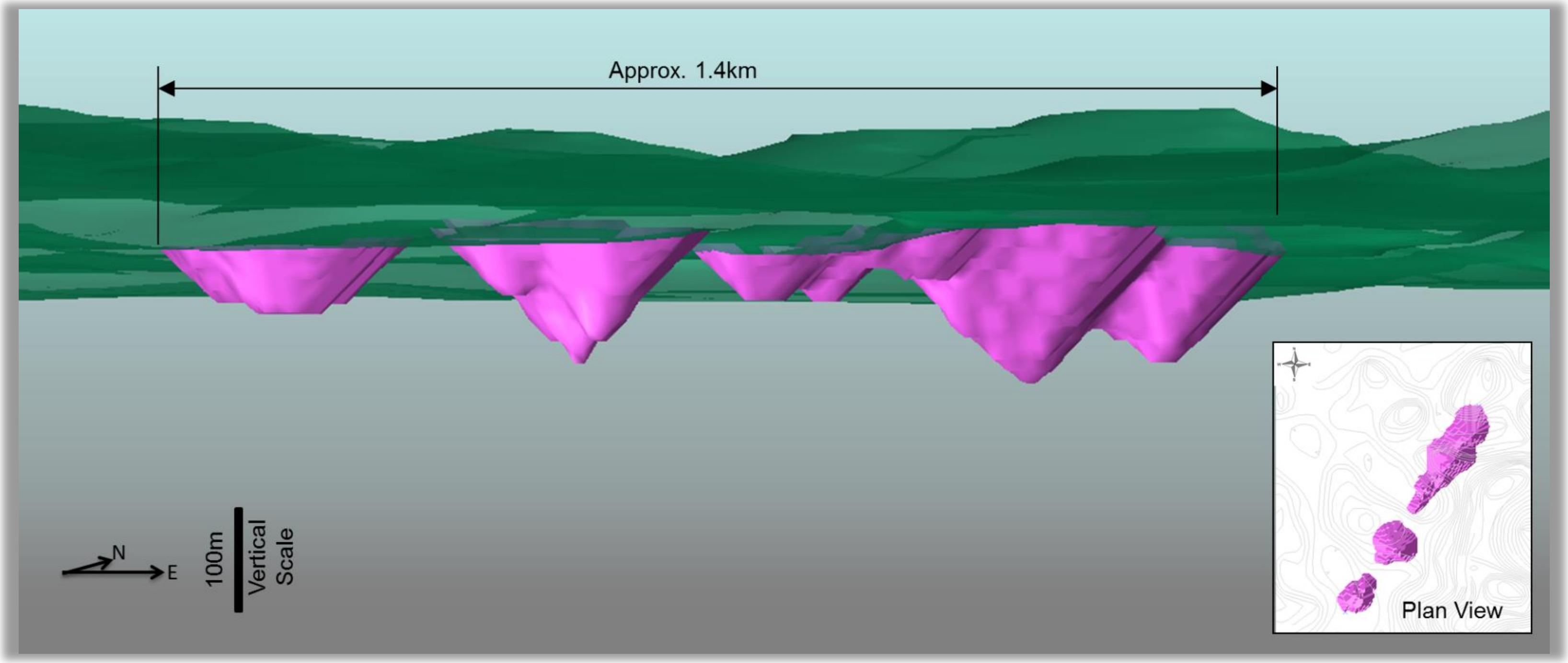


Figure 16.3 Sewum Pit Optimization, RF1 Pit Shell (3D View)

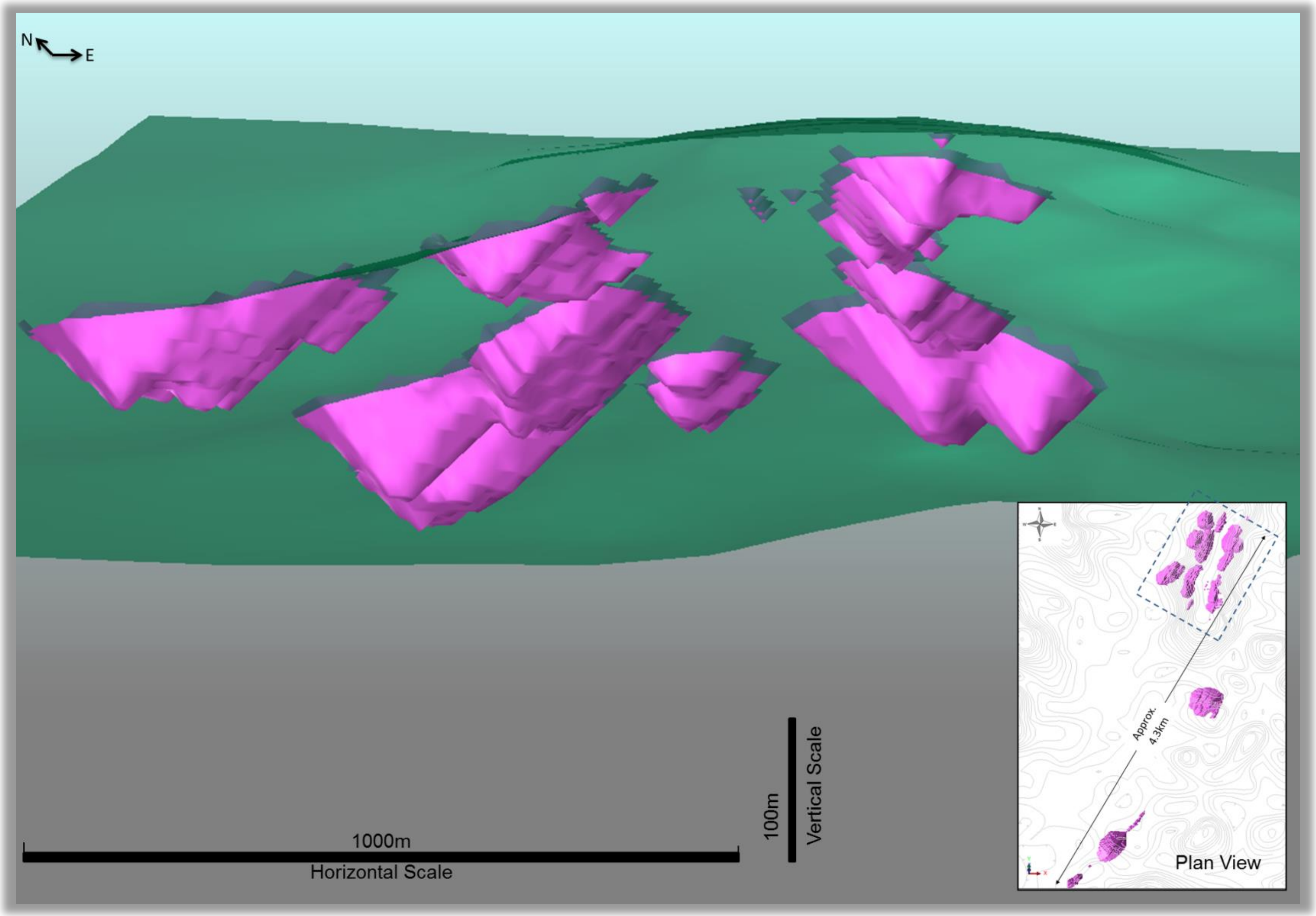
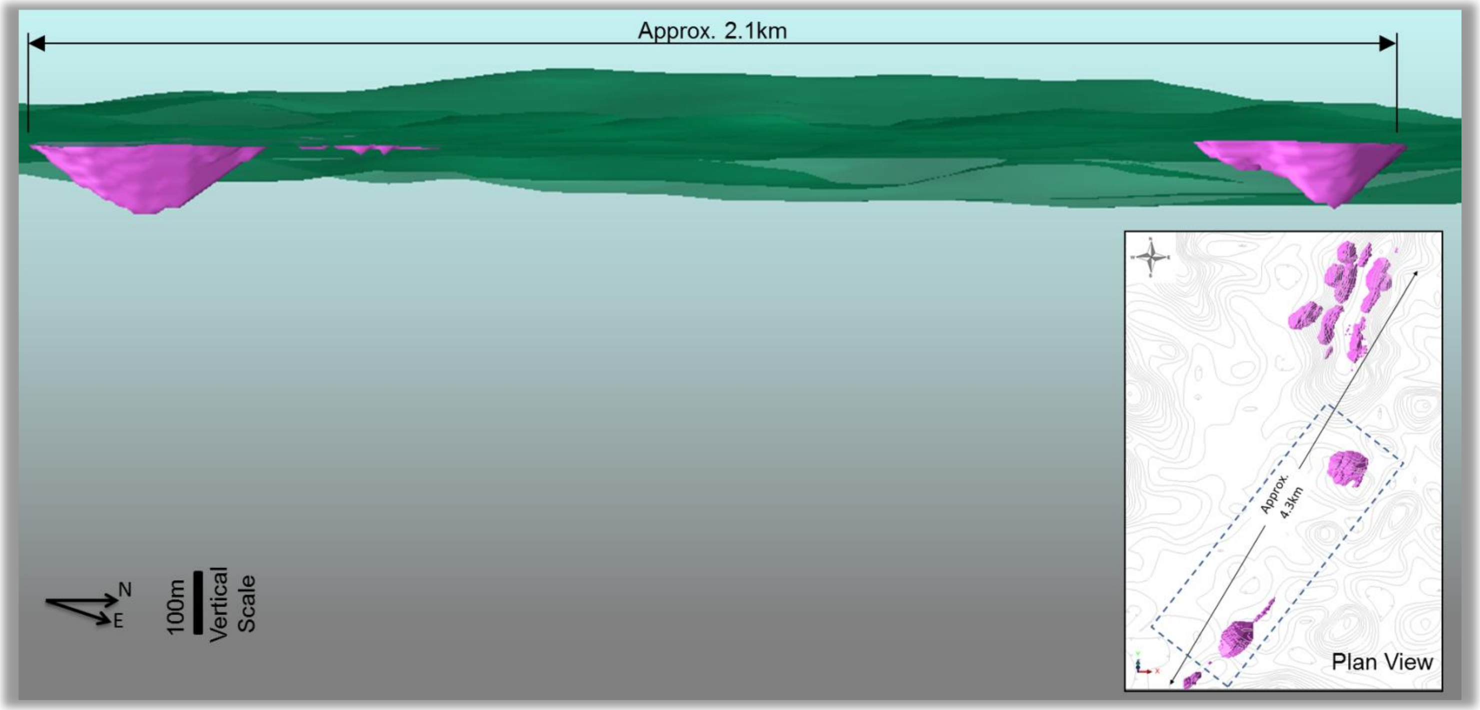


Figure 16.4 Sewum Pit Optimization, RF1 Pit Shell (3D view)

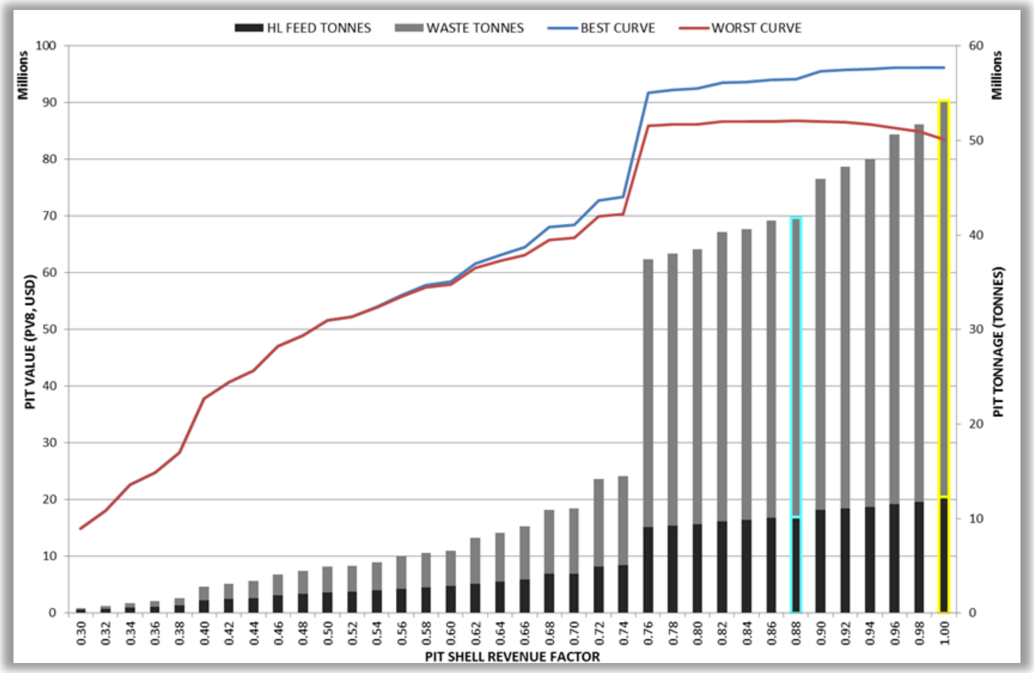


A basic schedule is applied to the pit shells to produce a 'pit-by-pit' graph. An objective of the pit-by-pit graph is to illustrate the impact of scheduling on the pit shells across a range of metal pricing and to select an optimum pit shell to use as a guide in the detailed pit design.

In this case, two schedules are represented. The best case schedule consists of mining out nested Pit Shell 1, the smallest pit, and then mining out each subsequent pit shell from the top down, before starting the next pit shell. This schedule is seldom feasible because the pushbacks are usually too narrow. Its usefulness lies in setting an upper limit to the achievable Present Value. The worst case schedule consists of mining each bench completely before starting on the next bench. This schedule is usually not feasible and its usefulness lies in setting a lower limit to the Present Value.

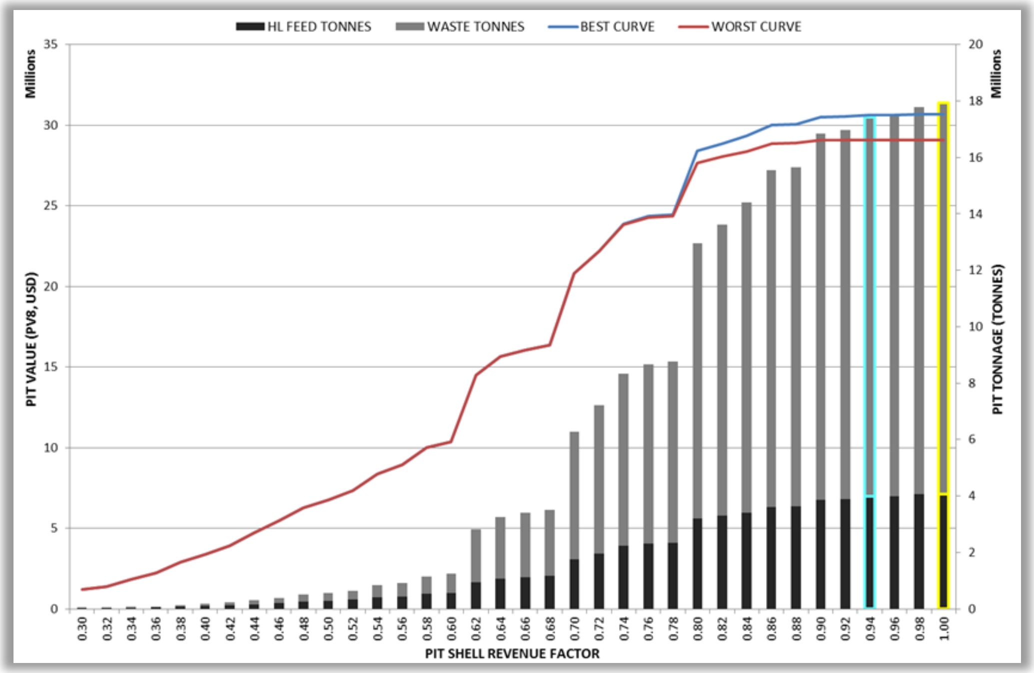
If, as is sometimes the case, worst case and best case Present Values differ by only a few percent then, for that pit, mining sequence is has less impact from an economic point of view. Figures 16.5 to 16.7 illustrate the pit-by-pit graphs for the three deposits.

Figure 16.5 Pit Optimization Results, Pit-by-Pit Graph, Boin Deposit



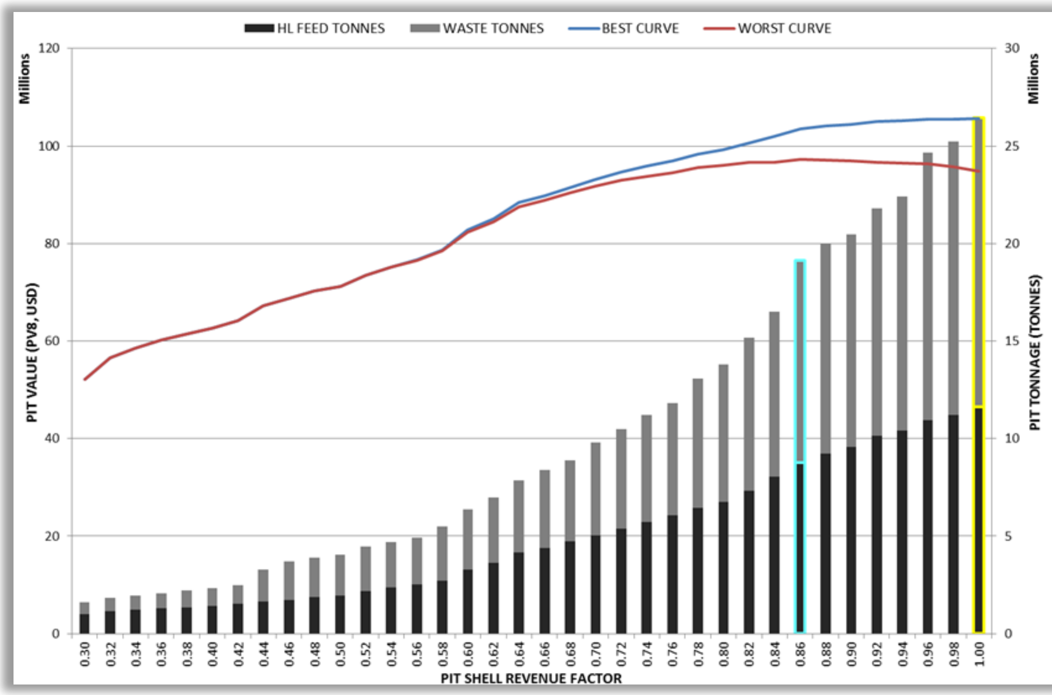
Note that the Present Value shown in the above figure is only as a guide in pit shell selection. The actual net present value of the Project is summarized in the Economic Analysis section of this report.

Figure 16.6 Pit Optimization Results, Pit-by-Pit Graph, Nyamebekyere Deposit



Note that the Present Value shown in the above figure is only as a guide in pit shell selection. The actual net present value of the Project is summarized in the Economic Analysis section of this report.

Figure 16.7 Pit Optimization Results, Pit-by-Pit Graph, Sewum Deposit



Note that the Present Value shown in the above figure is only as a guide in pit shell selection. The actual net present value of the Project is summarized in the Economic Analysis section of this report.

Based on the analysis of the optimization results, two pit shells for each deposit were selected to be used as guides for the detailed pit design. The pit shells selected were based on:

- The pit shell that had the highest value on the worst curve;
- The Revenue Factor 1 pit shell.

Table 16.5 summarizes the details of the pit shells selected.

Table 16.5 Pit Shell Selection for Detailed Mine Design

Deposit Area	Revenue Factor	Total Rock (Mt)	Heap Leach Feed (Mt)	Strip Ratio	Au Grade (g/t)
Boin	0.88	41.84	9.52	3.4	1.04
	1.0	54.21	12.25	3.4	0.96
Nyamebekyere	0.94	17.44	3.91	3.5	0.93
	1.0	17.94	4.06	3.4	0.92
Sewum	0.86	19.15	8.21	1.3	0.95
	1.0	26.46	11.62	1.3	0.82

16.2 ULTIMATE PIT DESIGN

16.2.1 ASSUMPTIONS

The detailed mine plans have been designed as an initial review of the potential project economics based on preliminary information. The objective of the designs was to follow the outlines of the selected pit shells while incorporating bench designs, minimum mining widths, and haulage ramps. Table 16.6 summarizes the design assumptions applied. Optimization of ramp locations and pit exits should be considered in the next level of project study.

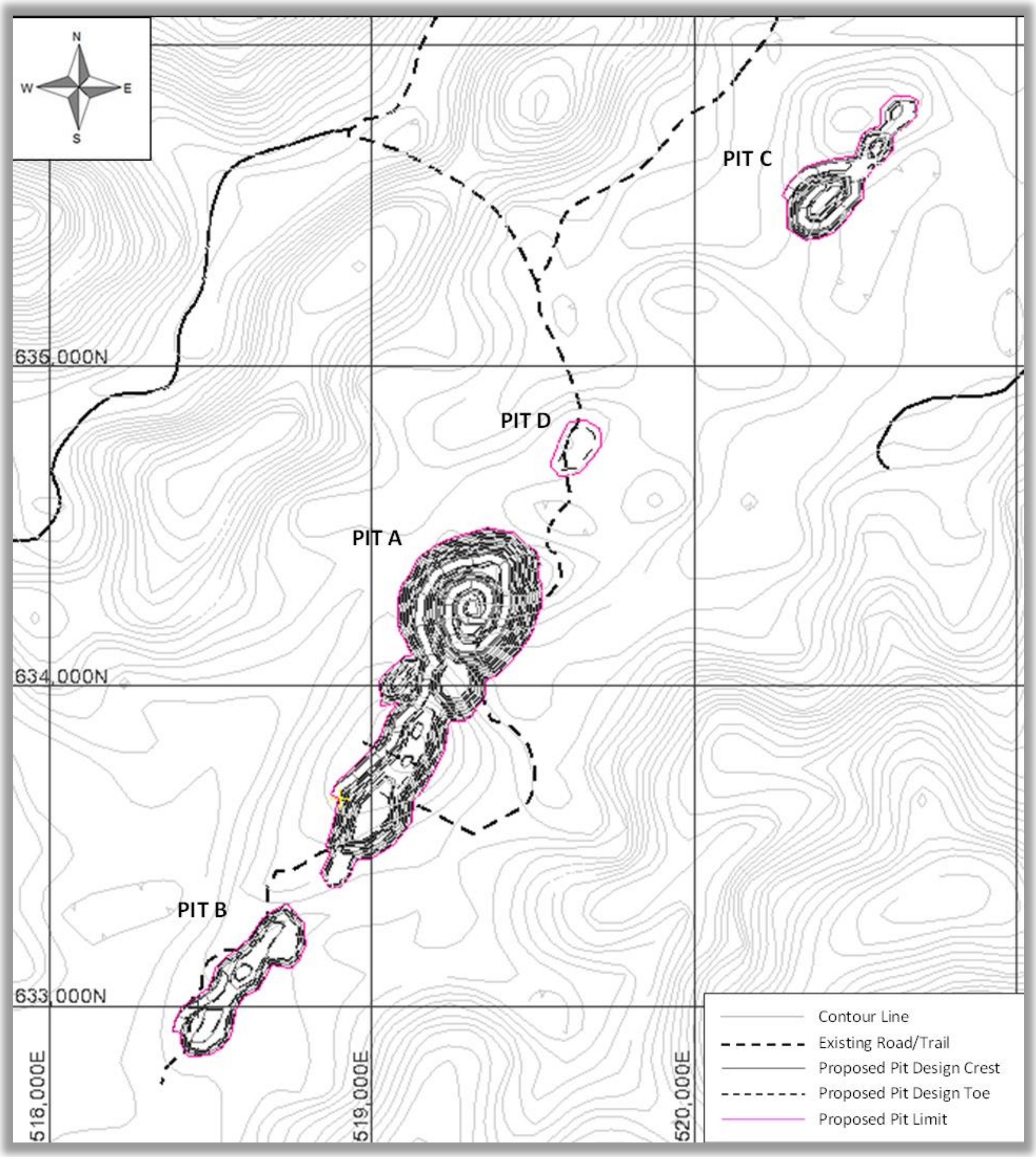
Table 16.6 Ultimate Pit Design Assumptions

Item	Unit	Assumption
Minimum mining width	m	20
Truck size operating width	t m	90 6.8
Haul road width, double lane (includes allowance for ditch and berm)	m	25
Haul road width, single lane (includes allowance for ditch and berm)	m	18
Haul road gradient	%	10
Bench design		
bench height	m	oxide, transitional – 10 fresh – 20
bench slope angle	Degrees	65 -75
berm width	m	oxide, transitional - 7 fresh - 9
interramp angle	Degrees	oxide, transitional - 44 -47 fresh - 55
overall slope angle	degrees	40 – 45

16.2.2 BOIN DEPOSIT

The ultimate pit design for the Boin Deposit area includes four pits (as identified on Figure 16.8).

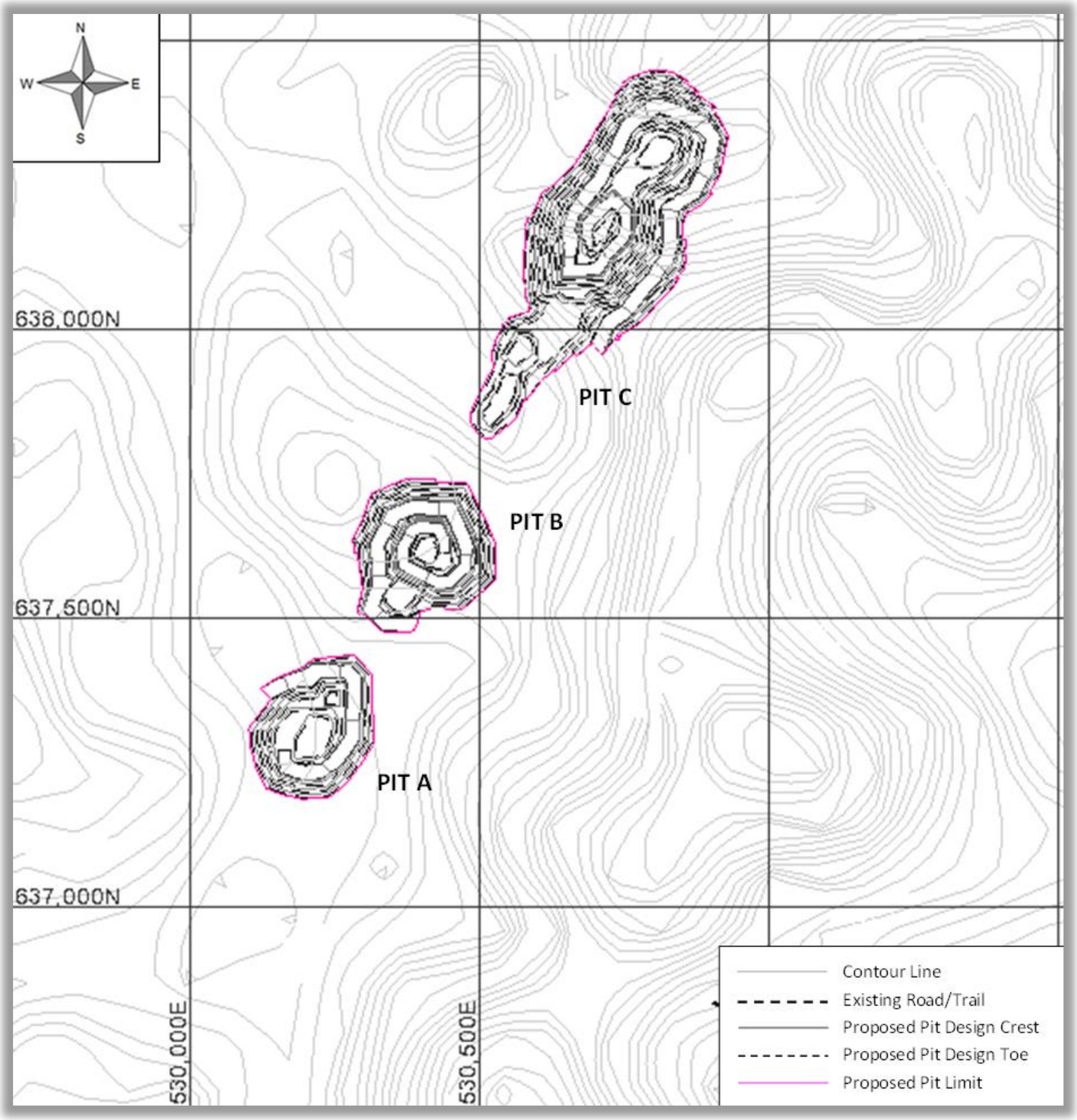
Figure 16.8 Boin Deposit Pit Design



16.2.3 NYAMEBEKYERE DEPOSIT

The ultimate pit design for the Nyamebekyere Deposit area includes three pits, as shown on Figure 16.9.

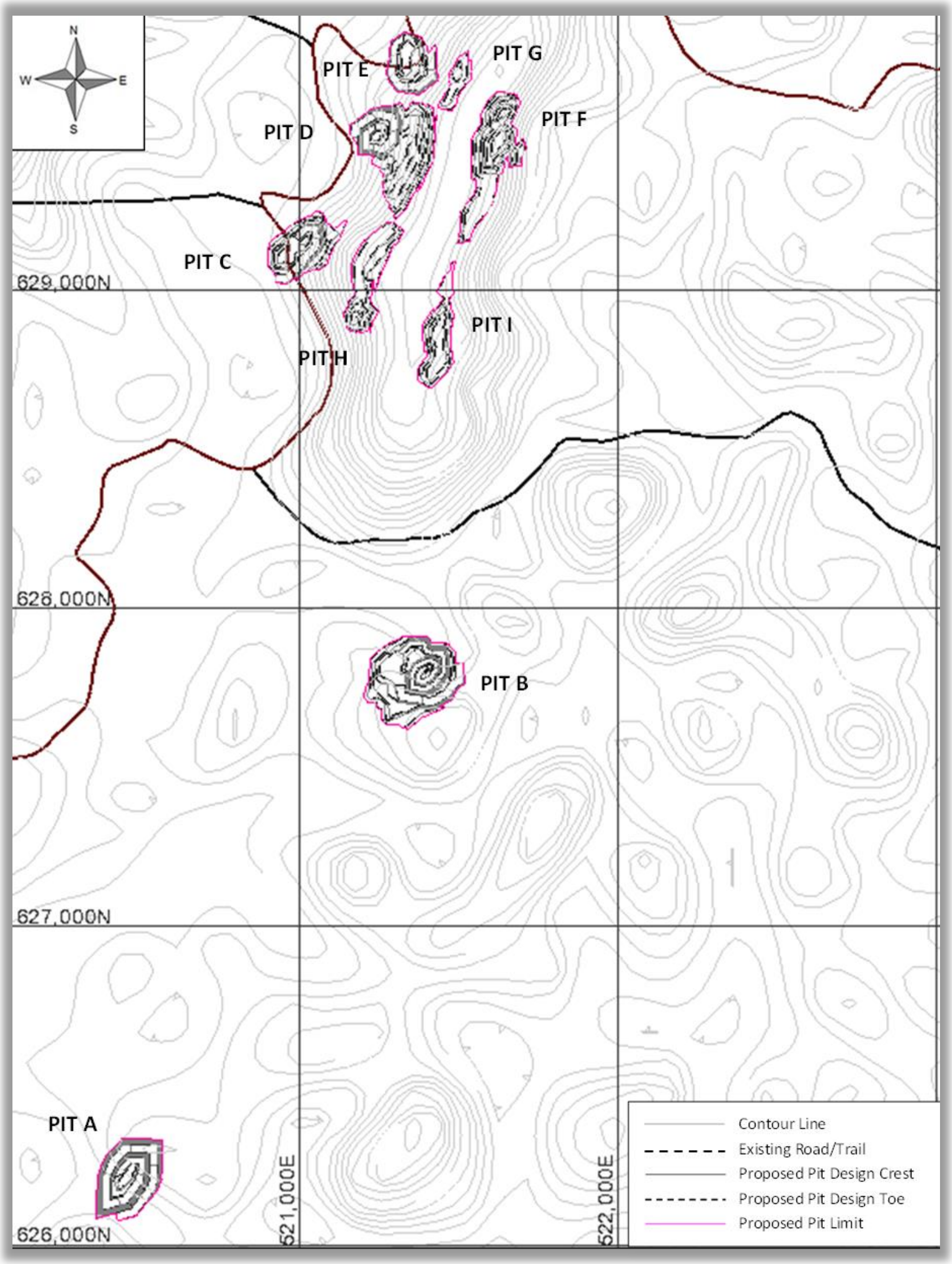
Figure 16.9 Nyamebekyere Deposit Pit Design



16.2.4 SEWUM DEPOSIT

The ultimate pit design for the Sewum Deposit area includes nine pits as shown on Figure 16.10.

Figure 16.10 Sewum Deposit Pit Design



16.3 PIT SCHEDULE

A mine production schedule was developed with the main objective of delivering 3.0 million tonnes per year to the heap leach facility. Other considerations for the schedule included:

- Commissioning and production ramp-up considerations during Year 1.
- Bringing forward higher value material where possible.
- Leaving the Fresh Material, which is a harder rock to crush, towards the end of the schedule, thereby limiting the amount of Fresh Material in the heap leach feed in the early years.

In order to achieve the mine schedule, mining would have to occur from more than one deposit area at a time. Mining equipment would require relocation from one deposit area to another at times. The sequence of extraction involved analyzing each deposit area and then each smaller discrete pit within each deposit area based on value. The higher value pits were identified and sequenced first.

The Life of Mine Schedule follows the Pit Sequence identified in Table 16.7. Tables 16.8 and 16.9 summarize the production schedule by deposit area and by material type, respectively.

Table 16.7 Pit Sequence for Life of Mine Schedule

Deposit Area	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Sewum	D, F	A,B,D,E	B, G, I	B,I	B, C	B, C	C,H	C,H		
Boin		C	A	A	A	A	A, B	A, B	D	
Nyamebekyere							C	C	A, B, C	

Table 16.8 Enchi Life of Mine Schedule – by Deposit Area

	Units	Total	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Sewum Pit												
Oxide Material	k tonnes	**9,284**	2,000	1,590	1,754	1,669	1,398	766	108	0	0	0
Transitional Material	k tonnes	**307**	0	49	0	204	54	1	0	0	0	0
Fresh Material	k tonnes	**48**	0	0	0	0	48	0	0	0	0	0
Total Heap Leach Feed	k tonnes	**9,640**	**2,000**	**1,638**	**1,754**	**1,873**	**1,500**	**767**	**108**	**0**	**0**	**0**
	g/t	0.86	1.52	0.92	0.70	0.63	0.56	0.53	0.52	0.00	0.00	0.00
Total Waste	k tonnes	**12,859**	**4,317**	**5,202**	**1,130**	**1,299**	**647**	**232**	**33**	**0**	**0**	**0**
Total Material	k tonnes	**22,499**	**6,317**	**6,840**	**2,884**	**3,171**	**2,147**	**999**	**141**	**0**	**0**	**0**
Boin Pit												
Oxide Material	k tonnes	**5,516**	0	1,016	1,238	1,085	1,033	520	419	18	186	0
Transitional Material	k tonnes	**3,144**	0	229	8	42	467	1,538	716	144	0	0
Fresh Material	k tonnes	**2,405**	0	117	0	0	0	175	1,756	357	0	0
Total Heap Leach Feed	k tonnes	**11,065**	**0**	**1,362**	**1,246**	**1,127**	**1,500**	**2,233**	**2,892**	**519**	**186**	**0**
	g/t	0.95	0.00	1.21	0.80	0.85	0.94	0.75	1.07	1.13	0.68	0.00
Total Waste	k tonnes	**47,317**	**0**	**4,547**	**8,095**	**8,198**	**9,130**	**10,254**	**5,966**	**539**	**589**	**0**
Total Material	k tonnes	**58,382**	**0**	**5,909**	**9,341**	**9,325**	**10,630**	**12,487**	**8,859**	**1,057**	**775**	**0**
Nyamebekyere Pit												
Oxide Material	k tonnes	**1,805**	0	0	0	0	0	0	0	1,535	269	0
Transitional Material	k tonnes	**1,703**	0	0	0	0	0	0	0	530	1,173	0
Fresh Material	k tonnes	**517**	0	0	0	0	0	0	0	1	517	0
Total Heap Leach Feed	k tonnes	**4,025**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2,066**	**1,959**	**0**
	g/t	0.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82	1.00	0.00
Total Waste	k tonnes	**17,844**	**0**	**0**	**0**	**0**	**0**	**0**	**3,654**	**9,246**	**4,944**	**0**
Total Material	k tonnes	**21,869**	**0**	**0**	**0**	**0**	**0**	**0**	**3,654**	**11,312**	**6,904**	**0**

Table 16.9 Enchi Life of Mine Schedule - by Material Type

	Units	Total	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Total Material Mined	k tonnes	**102,751**	6,317	12,749	12,225	12,496	12,777	13,486	12,653	12,369	7,678	0
Strip Ratio	w: HL	**3.2**	2.2	3.2	3.1	3.2	3.3	3.5	3.2	3.8	2.6	0.0
Waste Rock	k tonnes	**78,021**	4,317	9,749	9,225	9,496	9,777	10,486	9,653	9,785	5,533	0
Heap Leach Feed	k tonnes	**24,729**	2,000	3,000	3,000	3,000	3,000	3,000	3,000	2,584	2,145	0
	g/t	**0.91**	1.52	1.05	0.74	0.71	0.75	0.70	1.05	0.88	0.97	0.00
Oxide	k tonnes	**16,604**	2,000	2,606	2,992	2,754	2,431	1,286	527	1,553	455	0
	g/t	**0.87**	1.52	1.03	0.74	0.72	0.74	0.61	0.79	0.80	0.67	0.00
	Recovery		75%	75%	75%	75%	75%	75%	75%	75%	75%	0%
	Oz.	**349,482**	73,490	64,601	53,542	47,864	43,574	18,836	10,093	30,081	7,401	0
Transitional	k tonnes	**5,153**	0	277	8	246	521	1,539	716	673	1,173	0
	g/t	**0.88**	0.00	1.21	0.74	0.65	0.77	0.76	0.94	0.86	1.02	0.00
	Recovery		75%	75%	75%	75%	75%	75%	75%	75%	75%	0%
	Oz.	**108,874**	0	8,123	136	3,847	9,635	28,168	16,302	13,933	28,730	0
Fresh	k tonnes	**2,971**	0	117	0	0	48	175	1,756	358	517	0
	g/t	**1.15**	0.00	1.27	0.00	0.00	0.65	0.79	1.17	1.28	1.14	0.00
	Recovery		73%	73%	73%	73%	73%	73%	73%	73%	73%	0%
	Oz.	**80,093**	0	3,486	0	0	740	3,225	48,065	10,763	13,814	0
Total oz. Recovered		**538,450**	**73,490**	**76,210**	**53,677**	**51,711**	**53,949**	**50,230**	**74,460**	**54,777**	**49,945**	**0**

The increase in the heap leach feed grade in Year 7 is due to higher grade Fresh Material from the Boin deposit.

16.4 WASTE ROCK DISPOSAL

Waste rock generated from the Project will require the development of waste rock dumps. The dump size requirements for the various deposit areas are shown in Table 16.10. A swell factor of 30% and side slopes of 27 degrees were assumed in determining the volume and extent requirements.

Table 16.10 Waste Rock Disposal Volume Requirements

Deposit Area	Waste Tonnes (Mt)	Dump Volume Required (Mm^3)
Boin	47.3	24.6
Nyamebekyere	17.8	9.3
Sewum	12.9	6.7
Total	**78.0**	**40.6**

As no condemnation drilling has been undertaken, the purpose of illustrating the waste rock storage areas is to demonstrate possible spatial extents for the waste rock designs (refer to Figure 18.1). The waste rock storage areas were located to minimize waste haul distances from the pits. Where possible, backfilling mined out pits should be used to reduce project disturbance footprint.

16.5 EQUIPMENT SELECTION

The major mining equipment selected for the PEA study is summarized in Table 16.11. The mining equipment was selected to match the mine production schedule, which is based on 350 days/year, with four crews working 12-hour shifts.

Table 16.11 Major Mining Equipment, Annual Requirements

Equipment	Size / Example Model	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Haul truck	90t, HD785	4	8	9	10	11	13	11	11	7	0
Shovel	12 cu.m., PC2000	1	2	2	2	2	2	2	2	1	0
Loader	WA800	1	1	1	1	1	1	1	1	1	0
Primary drill	DP1500	1	1	2	2	2	2	3	3	2	0
Track dozer	D275A	2	4	4	4	4	4	4	4	2	0
Wheel dozer	WD600	1	1	1	1	1	1	1	1	1	0
Grader	GD825	1	2	2	2	2	2	2	2	2	0
Water truck	HD465WT	1	2	2	2	2	2	2	2	2	0
Utility excavator	CAT385	1	1	1	1	1	1	1	1	1	0
Utility loader	WA380	1	1	1	1	1	1	1	1	1	0
Boom truck		1	1	1	1	1	1	1	1	1	0
Mechanical service truck		1	1	1	1	1	1	1	1	1	0
Welding truck		1	1	1	1	1	1	1	1	1	0
Fuel/lube truck		1	1	1	1	1	1	1	1	1	0
Float truck		1	1	1	1	1	1	1	1	1	0
Crane		1	1	1	1	1	1	1	1	1	0
Tire handler	CATIT28	1	1	1	1	1	1	1	1	1	0
Anfo truck	1t	0	1	1	1	1	1	1	1	1	0

Equipment	Size / Example Model	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Explosive truck	5t	0	1	1	1	1	1	1	1	1	0
Light vehicles		7	7	7	7	7	7	7	7	7	0
Crew buses		2	2	2	2	2	2	2	2	2	0
Portable light towers		4	4	4	4	4	4	4	4	4	0
Gen-set		1	1	1	1	1	1	1	1	1	0

16.5.1 DRILLING AND BLASTING

The following assumptions were applied when estimating the drilling and blasting requirements.

- The oxide material would be free-digging and not require drilling and blasting.
- 50% of the transitional material would require drilling and blasting.
- 100% of the fresh material would require drilling and blasting.
- Drill and blast pattern size:
  - drillhole diameter: 150 mm (6”);
  - bench height: 10 m;
  - transitional material: 5 m x 5 m, with 1 m sub-drill, 0.2 kg/bcm powder factor;
  - fresh material: 4 m x 5 m, with 1.2 m sub-drill, 0.25 kg/bcm powder factor.
- Drill penetration rate of 35 cm/min.
- Total cycle time of 36 – 37 min depending on rock type.
- 5% allowance for re-drilling.

For the purposes of the PEA, the Sandvik DP1500 type drill rig was selected. It is a tophammer drill rig designed for mid-sized open pits and is also well suited for wall control and development works.

16.5.2 LOADING

A backhoe type hydraulic excavator was envisioned for the Project. A 12 m^3 bucket capacity was assumed when estimating the loading fleet requirements. Example models include Komatsu PC2000, Hitachi EX1900, and Caterpillar 6020.

Shovel fleet numbers have been estimated on first principles based on the operating hours required to achieve the production schedule, calculated by cycle times and estimates of the equipment’s rated capacities and productivities. The loading unit productivity assumptions are listed in Table 16.12.

Table 16.12 Loading Unit Productivity Assumptions

	Units	Value
Bucket capacity	cu.m.	12
Bucket fill factor	%	95
Dry density	t/bcm	2.5
Moisture	%	4%
Swell factor	%	40%
Tonnes/pass	wmt	21.2
Passes		5
First bucket cycle time	s	30
Subsequent bucket cycle time	s	35
Truck spot time	s	20
Total load time	s	190
Truck availability to shovel	%	90
Productivity	tph	1473

16.5.3 HAULING

To complement the loading equipment, a 90t capacity haul truck was selected to haul from the pits to the waste dumps and to the primary crusher. Example models include Komatsu HD785 and Caterpillar CAT777.

Haul truck fleet numbers have been estimated on first principles based on the operating hours required to achieve the production schedule, calculated by cycle times and estimates of the equipment's rated capacities and productivities.

Haul cycle times were determined using TalPac software. Table 16.13 shows the average annual cycle times estimated for the study.

Table 16.13 Average Annual Haul Cycle Times

Haul Route	Unit	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
To primary crusher	min	21.6	29.8	30.6	33.4	35.0	38.0	40.5	43.4	42.6	0
To waste dump	min	10.0	11.1	12.5	14.8	17.7	19.6	15.1	17.2	13.2	0

16.5.4 ANCILLARY SERVICE AND SUPPORT EQUIPMENT

The primary pit operations will be supported by additional equipment including track dozers with ripper attachments, wheeled dozers, road graders, water truck, and maintenance service vehicles.

16.5.5 PIT DEWATERING

An allowance has been included in the operating and capital costs for pit dewatering to pump water from pit sumps to settling pond(s). No pit dewatering or hydrogeological test work has yet been completed.

16.6 PIT OPERATION PERSONNEL

OWNER OPERATED OPTION SCENARIO

The manpower estimates are based on the equipment fleet required to achieve the production schedule. The mining operations manpower estimate included:

- Mine management and supervision;
- Mine maintenance supervision;
- Technical staff for pit engineering and geology;
- Administrative staff for mine operations, mine maintenance;
- Mine operations crews;
- Mine maintenance crews.

It was assumed that the workforce will largely consist of local personnel with certain supervisory roles filled by expatriate personnel. Table 16.14 shows the estimated labour by mine department used within the study.

Table 16.14 Pit Operations Personnel by Year

Mine Department	Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Mine Management	3	4	4	4	4	4	4	4	4	4	0
Mine Operations	1	60	101	113	117	125	129	129	129	93	0
Mine Maintenance	1	31	44	45	47	54	54	54	54	44	0
Mine Engineering	2	10	10	10	10	10	10	10	10	10	0
Grand Totals	**7**	**105**	**159**	**172**	**178**	**193**	**197**	**197**	**197**	**151**	**0**
Expat	6	6	6	6	6	6	6	6	6	6	-
Nationals	1	99	153	166	172	187	191	191	191	145	-
% National	14%	94%	96%	97%	97%	97%	97%	97%	97%	96%	0%

CONTRACT MINING OPTION SCENARIO

For the Contract Mining scenario, a detailed labour list was not provided with the Contractor quotes. The assumption is that the Pit Operations personnel levels would be similar to the Owner Operated scenario listed in Table 16.14, with the addition of a small Owner Technical Team.

17 RECOVERY METHODS

17.1 OVERVIEW

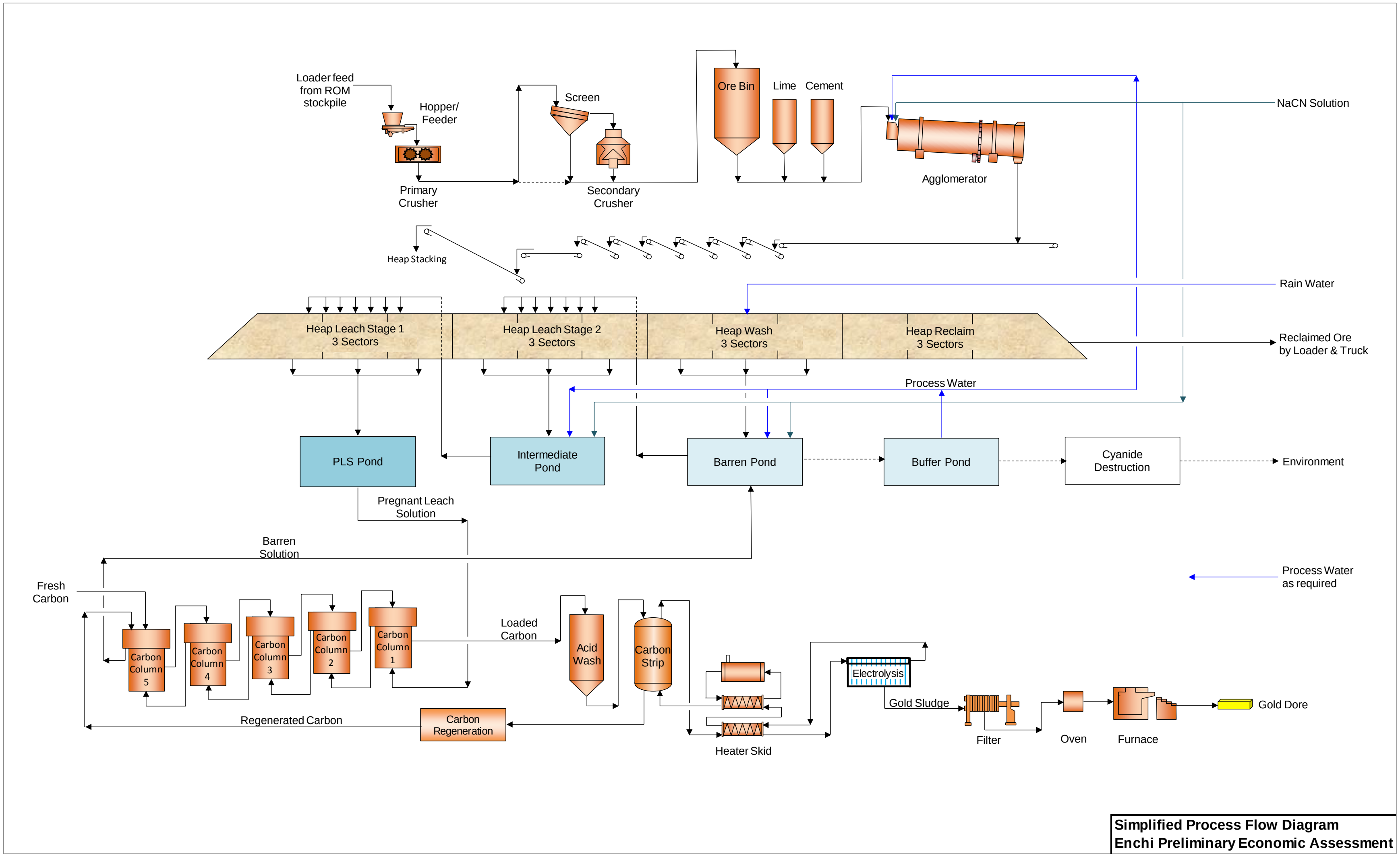
Due to the lack of test work for direct heap leach amenability, only a conceptual design has been studied for the purpose of the PEA. The process facility for the Project has been designed to process oxide or saprolite mineralization from the Boin, Nyamebekyere, and Sewum deposits. The process route selected is a conventional heap leaching facility. The heap leach pads and recovery plant will operate year-round while crushing, agglomeration and stacking will be shut down during wet weather periods. The design is similar to existing and operating heap leach mines processing similar material under comparable conditions.

The following is a summary of the recovery methods.

- The run-of-mine (ROM) material will be delivered by haul trucks from the open pits to a pile adjacent to the primary crusher.
- During regular operations (300 d/a), a loader will feed a hopper and apron feeder will draw the material to a twin shaft mineral sizer.
- Primary crusher product will be transported by conveyor directly to the secondary crusher feed screen.
- The secondary crusher will reduce the average particle size to a final P_{80} of 25 mm, suitable for agglomeration with cement as a binding agent, water for wetting the product to 10% moisture, lime for pH control and sodium cyanide solution.
- The agglomerate will then be transported and stacked onto the heap leach pads through a series of moveable conveyors.
- A dilute process solution containing cyanide will be applied in counter-current two stage application to the pads through a drip or wobbler irrigation system.
- The resultant pregnant leach solution (PLS) will flow through the collection system and stored in the PLS pond.
- The PLS will be pumped to an adsorption-desorption-recovery (ADR) plant for gold recovery. The gold will be adsorbed onto activated carbon granules, then periodically stripped from the carbon using a Zadra type desorption process.
- The gold will then be plated onto steel wool cathodes in an electrowinning cell, removed by pressure washing, filtered, dried and then smelted to produce doré bullion.

Based on a design throughput rate of 3 Mt/a (10,000 t/d) and an overall gold recovery of 75%, approximately 65,000 troy oz/year gold doré will be achievable. Each process step is described in more detail below. Figure 17.1 illustrates a preliminary simplified process flow diagram.

Figure 17.1 Simplified Process Flow Diagram



17.2 PRIMARY CRUSHING

The ROM material will be delivered to a dump pile adjacent to the primary crusher by haul trucks from the pit. A loader will feed a hopper and an apron feeder will draw the material to a twin shaft mineral sizer at a feed rate of approximately 550 t/h. The crushed product will have an average particle size P_{80} of 100 to 150 mm and will be transferred to the secondary crusher feed screen. The average crushing plant availability will be 75% during regular operations (300 d/a).

17.3 SECONDARY CRUSHING

The screen feed conveyor will be equipped with a belt scale and magnet to remove any tramp metal that may damage the cone crusher. The screen will be arranged to handle the nominal feed rate from the primary crusher with deck aperture of 40 mm. The average screen undersize product will be 25 mm. The screen oversize product material will discharge onto a 1.8 m diameter cone crusher with a closed side setting of 25 mm. The cone crusher product will be combined with the screen undersize and conveyed to the crushed product surge bin.

17.4 AGGLOMERATION

The crushed product surge bin will have a one hour retention capacity. Operating 20 h/d with 80% availability, the agglomeration system will use two vibrating feeders to draw the product from the surge bin and control the feed rate to a nominal 520 t/h to be conveyed directly into a 3 m diameter x 10 m long inclined rotating agglomeration drum with about 3 minutes retention time. Cement and lime will be added to the material at a controlled rate. Approximately 15 kg/t of cement and 2 kg/t of lime are incorporated in the design. Water and sodium cyanide solution will also be added to the agglomerator feed to wet the product to about 10% moisture.

17.5 HEAP STACKING

Agglomerated material is transported to the heap leach pad by a series of overland conveyors and grasshopper-type portable conveyors to a moveable radial stacker conveyor with a 40 m stacking width. An on/off heap leach pad arrangement has been assumed with a design heap height of 6 m. As the stacker conveyor retreats up the slope of the pad, the grasshopper conveyors will be removed and relocated to an adjacent area so that the heap will be constructed in a series of 40 m wide by 420 m long sectors. A total of 12 sectors will be used in three stages, three first stage leach sectors, three second stage leach sectors, and three wash sectors with three spare sectors to off-load and prepare for stacking. A detailed stacking plan and irrigation plan will have to be developed for the next level of study.

17.6 LEACHING AND SOLUTION IRRIGATION

The stacked material will be irrigated by drip or wobbler emitters at a rate of 10 L/h/m^2 with a dilute solution of sodium cyanide which percolates through the heap, leaching the gold during a 90-day leach cycle. The solution is delivered through a network of irrigation piping including a 24’’ primary central feed pipe, a 12’’ secondary pipe, and 4’’ delivery pipes along each irrigation section to which the drip emitter lines are attached. Each irrigation section will be nominally 40 x 50 metres in size.

17.7 SOLUTION COLLECTION AND PONDS

After passing through the heap, the leachate solution and storm water is collected by a network of pipes at the base of the heap leach sectors and flows by gravity to storage ponds. Basically the reverse of the irrigation system, underneath the heap embedded within the drain rock, the collection pipe network will consist of a series of 4'' perforated pipes spaced approximately 4 m apart, connected to 12'' secondary pipes. The secondary pipes then connect to the outside main 24'' pipes that transport the solution to the ponds.

Low-grade solution from the second stage leach sectors is collected in an intermediate leach solution pond with an operational storage volume of approximately 6,000 m^3. The low-grade solution from the intermediate leach solution pond is then used to irrigate the newly stacked first stage leach sectors with vertical pumps via the irrigation piping.

This two-stage counter-current irrigation system results in higher grades being collected in a pregnant leach solution (PLS) pond with an operational storage volume of approximately 12,000 m^3. Vertical or submersible pumps located in the PLS pond will be used to pump the PLS at a rate of approximately 480 m^3/h to the gold recovery plant or adsorption / desorption / regeneration (ADR) plant.

Barren solution from the ADR plant will be collected along with water flows from previously leached sectors into a barren solution pond with an operational storage volume of approximately 18,000 m^3. Sodium cyanide solution, lime, anti-scalant, and water will be added to the barren solution pond. Vertical pumps will be used to transfer the weak solution to the second stage leach sectors via the irrigation piping.

A buffer or emergency pond will be used to temporarily store excess process solution that may occur during upset conditions, floods, or excess storm water. The operational storage volume of approximately 51,000 m^3 is sized to contain peak precipitation events. The solution will be recycled back to the heap leach circuit during normal operation. In the event storage volume is at capacity, then the solution will be treated through the cyanide detoxification circuit prior to discharge to the environment.

All solution systems are designed for 100% availability at 365 days per year since solution flow continues even when stacking is shutdown during wet weather periods.

17.8 GOLD RECOVERY PLANT

The ADR plant will receive pregnant leach solution from the PLS pond by vertical or submersible pumps at a rate of approximately 480 m^3/h. The plant will use an efficient carbon-in-column (CIC) recovery process with industry proven techniques as described below. The recovery of gold to carbon using this process is typically 95%. Final selection of process flow is to be determined at later stages of study.

17.8.1 CARBON ABSORPTION

The PLS solution will be fed to the CIC circuit where the dissolved gold in solution is absorbed by the activated carbon granules in a train of five cascade type carbon columns. Each column, about 2.94 m diameter and 2.94 m high, will contain approximately three tonnes of activated carbon granules. The PLS will be fed to the first column and will flow by gravity from column to column. In each column, the PLS will flow upwards creating a rising current suitable for suspending the activated carbon granules, allowing the gold to be adsorbed onto the carbon granules. The carbon will be transferred in a counter current manner to the flow of PLS, from one column to the next every 1.9 days.

The barren solution leaving the last column will have a weak gold concentration and is transferred back to the barren pond for re-use at the heap leach facility. The carbon in the first column with high gold content, termed ‘loaded’, is transferred to the acid wash. By exposing the freshest carbon to the weakest gold concentration PLS, the counter-current CIC circuit has been proven to maximize gold recoveries to the loaded carbon and minimize residual gold concentration in the barren solution.

17.8.2 ACID WASHING

The three tonnes of loaded carbon from the first column of the CIC circuit will be transferred to an acid wash column and washed by a circulating dilute hydrochloric acid solution at approximately 3%. The acid wash cycle time will be approximately 6 hours and is designed to control scaling and other inorganic contaminants on the carbon granules so as to maintain its ability to absorb gold. After the acid wash cycle is complete the carbon batch will be transferred to the elution column.

17.8.3 ELUTION / STRIPPING

Once acid washed, the loaded carbon will be transferred to the elution column or strip vessel designed to treat a three-tonne batch of loaded carbon. At high temperature and pressure, the Zadra-type desorption process uses a hot caustic and sodium cyanide solution which is recycled through the bed of carbon to remove the gold from the carbon. The elution solution will be heated using a heater skid consisting of stainless steel plate and frame heat exchangers and a fuel-fired water heater. The hot elution solution will flow upward through the elution column/strip vessel; 1.1 strips per day will be required. The total elution cycle time, including carbon transfer, will be about 20 hours producing a gold bearing strip solution or ‘eluate’ at a flow rate of 6 m^3/h. The eluate will then flow by gravity through cooling heat exchangers to the electrowinning circuit which operates in closed circuit with the elution column.

17.8.4 ELECTROWINNING AND SMELTING

Gold will be recovered from the eluate by electrowinning where it is plated onto steel wool cathodes in two 100 ft^3 electrowinning cells. The barren solution ‘electrolyte’ will exit the cells by gravity into the electrowinning solution return tank, from which it will be recycled back to the elution column. Caustic and cyanide will be added as needed to maintain the required solution strength. The gold concentrate will be washed from the cathodes periodically with a high-pressure water sprayer, and then dewatered through a plate and frame pneumatic/hydraulic filter press. The gold filter cake will be dried in an oven and mixed with fluxing agents then smelted in a fuel-fired furnace and poured into 1,000 oz doré molds. The doré bullion will be shipped off-site for further refining. The plant is expected to produce approximately 65,000 oz Au/year.

17.8.5 CARBON HANDLING AND REGENERATION

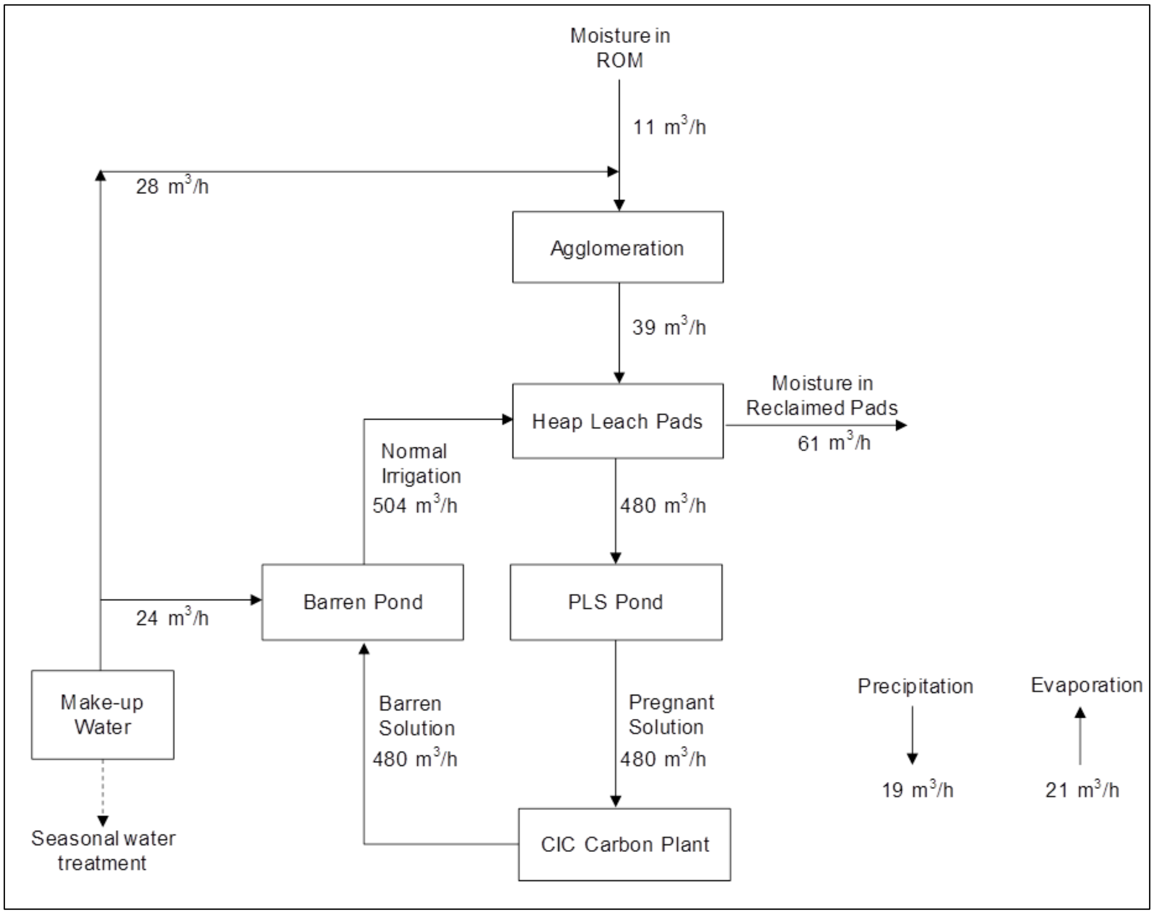
After gold removal in the elution/stripping column, the eluted/stripped carbon or ‘barren’ carbon is screened with a portion transferred to a fuel-fired regeneration kiln where it is thermally regenerated at a temperature of about 750^{o}C. Before returning to the circuit, the regenerated carbon is sized in a carbon sizing screen to remove any fines generated from handling and transfer of carbon between the various unit operations. The carbon fines are recovered by means of a filter press, collected and sent off the Property for trace gold recovery. Lost activated carbon is replenished by new carbon after attrition and fines removal. Fines from fresh attrited carbon are discarded as they contain no gold. Fresh and regenerated carbon is returned to the CIC circuit in the last column where the PLS gold concentration is weakest.

17.9 PROCESS WATER BALANCE

The process design takes into consideration the circulation of solutions through the heap leach pads, collection ponds, recovery plant, as well as precipitation and evaporation on an annual basis. Using data collected from Edgewater with respect to average annual precipitation and evaporation in the area, the results of the water balance estimates the make-up water requirements to maintain zero discharge of solutions. This gives an indication of how much water is needed per year but by no means does it indicate the peak water consumption when not raining and evaporation is high or when precipitation is high and all water cannot be retained and some discharge of solution will need treatment.

The water balance as shown schematically on Figure 17.2 uses annual average flow rates and volumes and is dependent on the moisture content in the ROM material, the amount of water used to wet the product during agglomeration, as well as the moisture retained in the heap leach pads. Changes in the moisture content in these areas will affect the make-up water requirements. The design solution irrigation rate to the heap leach pads will be 504 m^3/h based on a nominal rate of 10 L/h/m^2. Taking into consideration the moisture retained in the heap leach pads, evaporation losses, and precipitation gains, the average annual PLS solution flow to the carbon columns will be 480 m^3/h. Make-up water is assumed to come from the buffer or emergency pond (sized based on 1 in 100-year precipitation) when excess water is available and rain is assumed to be used as wash water. While annual evaporation in the area is only slightly higher than precipitation, they have little effect on the water balance. The make-up water requirements based on seasonal climate conditions will need to be evaluated.

Figure 17.2 Water Balance Flow Diagram



Note: All flows are based on 8,760 hours per year and average annual precipitation and evaporation conditions.

17.10 CYANIDE DETOXIFICATION

The process water balance is such that there will not be the need for a cyanide detoxification process until the final heap sectors have been fully leached, at which time water will circulate and rinse the pads to remove the majority of the residual cyanide. During this period, no water will be discharged to the environment; however, as the water continues to recirculate through the heap, metal concentrations will continue to increase. After the heap is rinsed, it will be drained and water will flow to the detoxification process, where hydrogen peroxide along with copper sulfate will be added. The hydrogen peroxide cyanide detoxification process is common practice in the gold industry to reduce cyanide concentrations to environmentally acceptable levels for discharging to the environment. The water will have a very low cyanide concentration, but may still contain other metals, requiring a mine water treatment plant. Other methods of cyanide destruction such as the Inco process or bacterial process can be considered at the next level of study.

18 PROJECT INFRASTRUCTURE

18.1 EXISTING REGIONAL INFRASTRUCTURE

Due to the variable nature of infrastructure in developing countries it is important to consider the status quo of the available infrastructure in the region in which the Project is located. The Aowin-Suaman district, in which the Project is located, forms part of the Western Region of Ghana.

Enchi, which is the capital of the Aowin-Suaman district, is the closest town (approximately 20 km northeast) to the Project area. The coastal port town of Takoradi, also located in the Western Region, is closest port of entry from the Gulf of Guinea and is located approximately 225 km southeast of the Project. Accra, the capital of Ghana and the main port of entry into Ghana by sea and air, is 220 km east of Takoradi. Access from Takoradi to Enchi and the surrounding area is via surfaced roads through the towns and villages of Agona, Tarkwa, Bogoso, Bawdie, and Asankragua, of which the Asankragua-Enchi road has recently, or is being, surfaced, according to the Ghana Ministry of Roads and Highways. Alternatively access from Takoradi to the site from the southeast is via the surfaced Agona-Elubo road (approximately 136 km). From Elubo the gravel Elubo-Enchi road, which passes through a densely forested area with relatively severe topography, approaches the Project area from the south before intersecting with the Asankragua-Enchi road (approximately 70 km).

Ghana's current electrical generation capacity of 2,125 MW is made up of about 50% hydro and 50% thermal plants. Access to the network in the Western Region is however, inadequate and unreliable and remains a major constraint to future economic growth. The closest substation to the Project is located 50 km to the south in Elubo which is serviced by a 225 kV line from Prestea to the east. The main source of residential lighting in the area is by kerosene lamp. There is a 33 kV line available near the Property with a couple of options for connection routes depending on demand and capacity required, with the utility company deciding on the preferred set up.

In rural districts such as Aowin-Suaman, over 60% of the local residents use rivers, streams, dugouts, spring or rain water as their main source of water, with only 8.7% having access to processed pipe-borne water.

The availability of sanitary facilities seems to be a major problem in the region, as about 40% of the dwellings have either no toilet facility or use a public toilet. In Aowin-Suaman about 65% of the households have a toilet facility in the dwelling unit in the form of a pit latrine.

The Enchi Government Hospital currently has one medical officer, two physician assistants, and 15 professional nurses. Other personnel include midwives, cicatrix nurses, community health nurses, pharmacists, x-ray technician, laboratory technicians, and supporting staff. Services include out-patient and in-patient treatment, general surgery, general medicine, laboratory services, x-ray services, and catering services. Other medical clinics in the area include the Presbyterian Health Center and the Sewum Clinic.

Residents in over 40% of the localities in Aowin-Suaman have to travel up to 20 kilometres before having access to a fixed line telephone. Residents of Enchi are one of the few locations in Ghana to have fixed line telephone transmission facilities provided by Vodafone. Mobile phones are the dominant form of communication with a teledensity of over 80 per 100 persons. MTN and Vodafone are the largest mobile service providers in Ghana. MTN services are available in Enchi.

Fuel, accommodations, food, and most supplies can be obtained in the town of Enchi.

18.2 PROJECT SITE LAYOUT

As the Project is located in a rural area between the villages of Sewum and Alatakrom, 20 km south of Enchi, the majority of the infrastructure works will be greenfields. The Project site has none or very limited existing infrastructure. The existing main gravel road, Elubo-Enchi road, passes between the mine sites, and the villages are services by local gravel roads (see Figure 18.1).

The proposed project's overall site layout is shown on Figure 18.1. Figures 18.2 through 18.5 illustrate a close-up view of the four areas, Process Plant area, Boin Mine area, Nyamebekyere Mine area, and Sewum Mine area.

Figure 18.1 Enchi Mine Site Plan

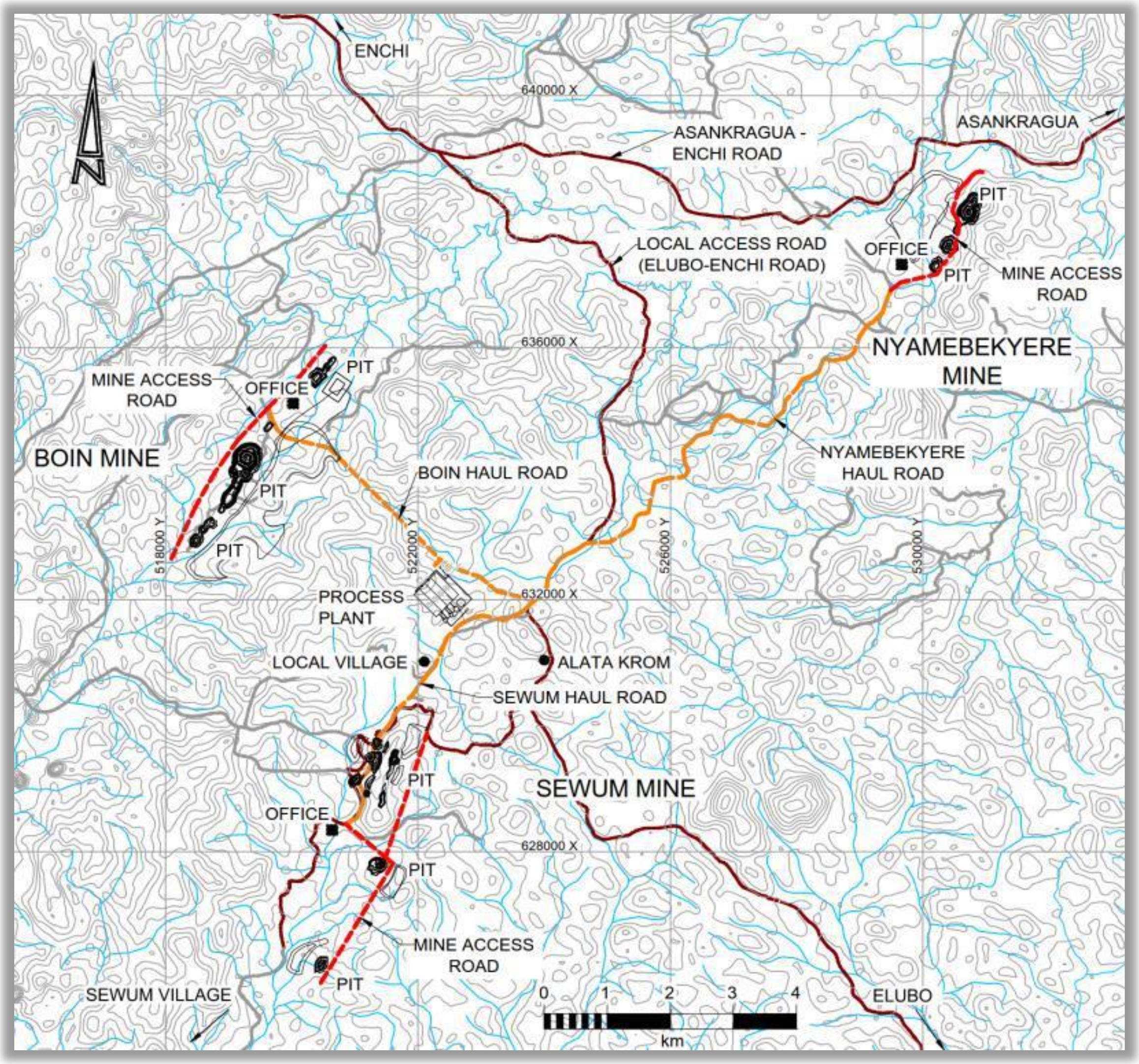


Figure 18.2 Schematic Site Plan of the Process Plant Area

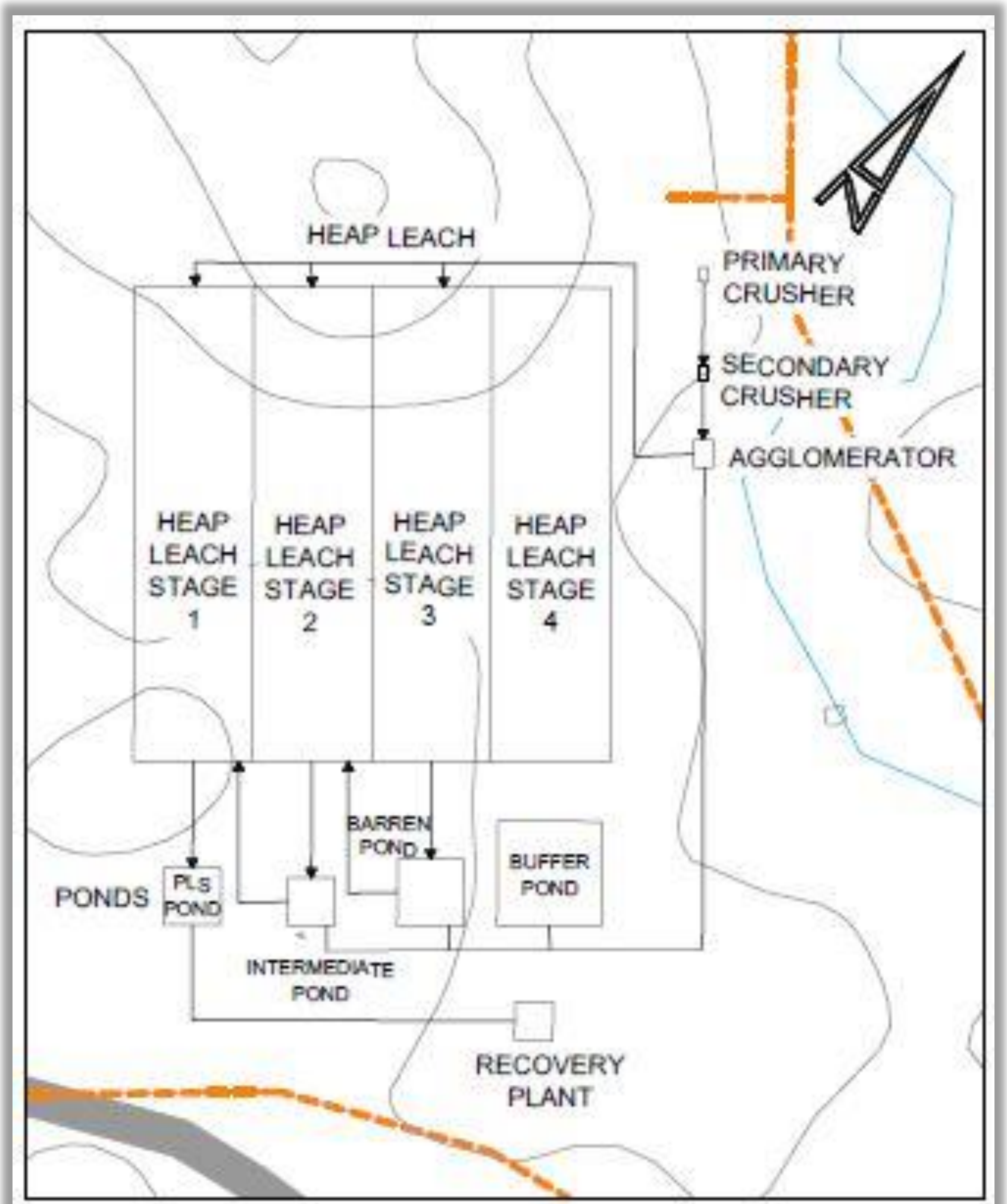


Figure 18.3 Boin Mine Area

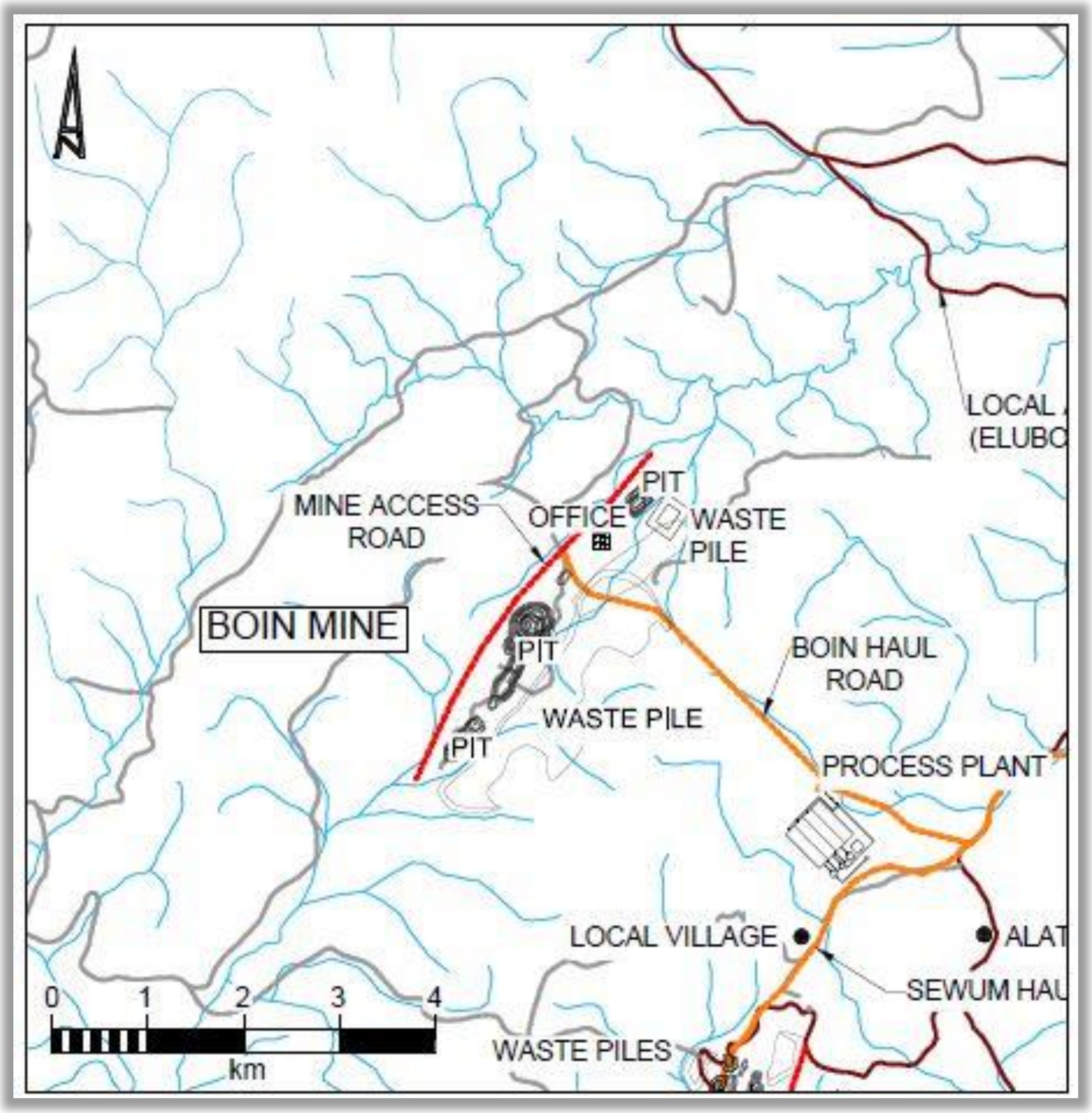


Figure 18.4 Nyamebekyere Mine Area

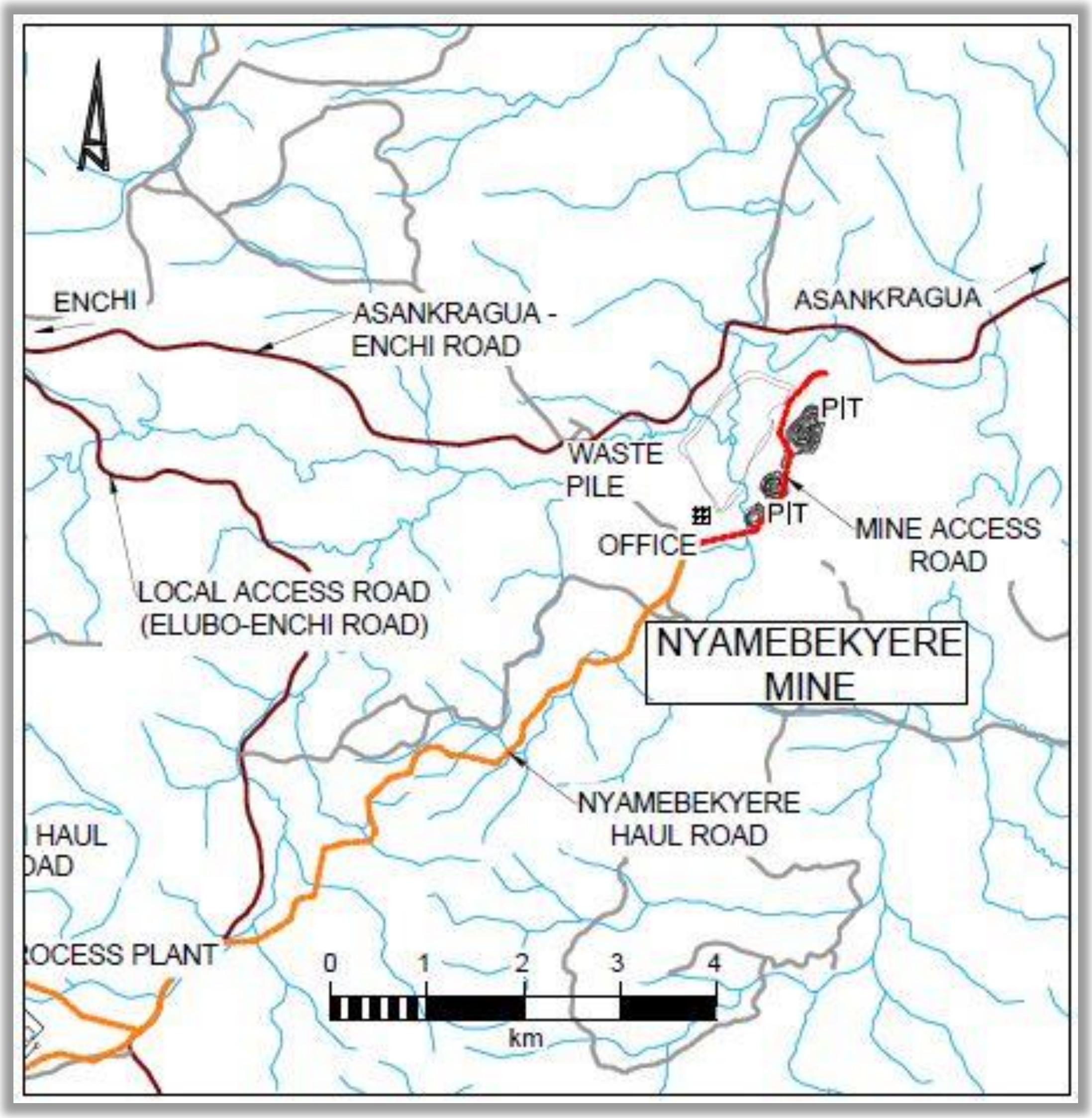
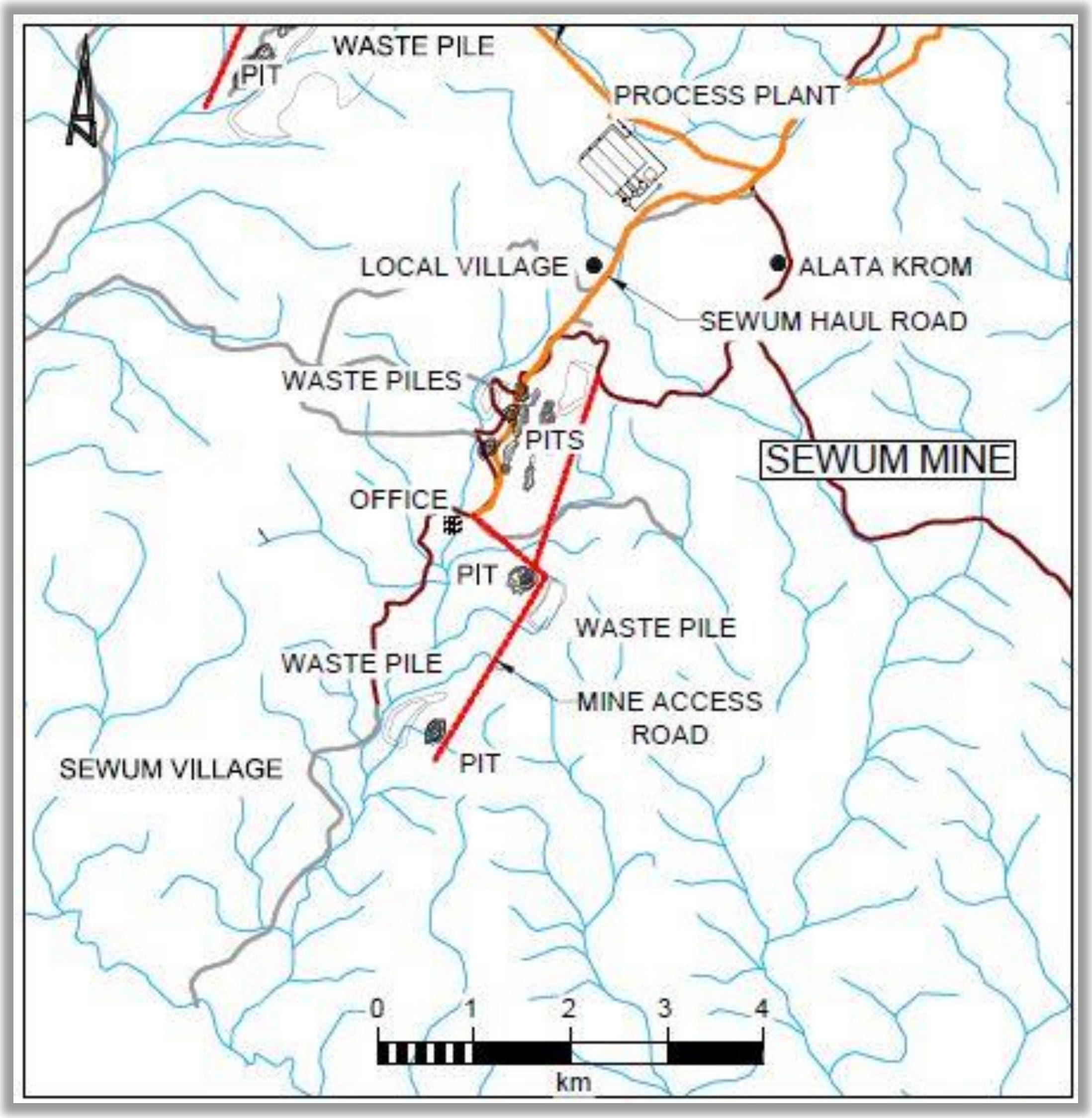


Figure 18.5 Sewum Mine Area



18.3 SITE DEVELOPMENT

The locations of site surface infrastructure, haul roads, and access roads for the PEA were based on preliminary topographic data (20 m contours, water bodies, roads and railways) and limits imposed by the location of the pit.

Site preparation will consist of the removal of trees, clearing and grubbing of areas that will accommodate the main processing area, administration buildings, and the maintenance complex. Sites will be levelled and graded only in areas where construction will take place. Cut-and-fill will be utilized where large, level areas are required.

A total area of approximately 50 ha is estimated to be developed for the main processing area, administration buildings, and the maintenance complex.

The plant site areas will require a geotechnical investigation prior to the next phase of the Project to determine the suitability of the proposed locations and types of material countered.

18.4 PROJECT INFRASTRUCTURE

The infrastructure will support the mining, plant, and construction operations. The main mine site will contain all the mining workshops, processing plant operations, and administration buildings and is located central to the pits at Boin, Sewum, and Nyamebekyere (see Figure 18.1).

The open pit mine sites of Boin, Sewum, and Nyamebekyere are located outside of the main mine area and are controlled as separate operations. Each will be connected to the main mine site by haul roads and have a mine access road with satellite offices.

Infrastructure and service requirements to support the mining and processing operations are summarized below.

→ Main mine site:
  - administrative and mine dry complex;
  - ancillary buildings (assay lab, explosive magazine, etc.);
  - fuel storage and distribution;
  - maintenance complex (mechanical and electrical);
  - internal roads connecting facilities;
  - ROM stockpiling area.

→ Power supply and distribution.

→ Water supply and distribution.

→ Surface water management.

→ Sewage and waste management.

→ Mine pit access and haul roads.

→ Satellite office facilities at the Boin, Sewum, and Nyamebekyere mine sites.

18.5 MAIN SITE

In support of the mining operations the main site will include a mine dry building, equipment maintenance workshops, refuelling facilities, and an explosives magazine.

Infrastructure related to the processing plant will include internal access roads, stock pile areas, related office and administration buildings, assay laboratory, and warehouse.

In addition there will be storm water handling facilities, a water supply and power supply network, diesel generators, sewage treatment plant, waste management facilities, and site access road.

18.5.1 WATER SUPPLY

Numerous water sources are available in the local region, in addition to water collected on-site with surface water management infrastructure. It is recommended that a site water balance be done to determine the consumption and required storage capacity. Potable water for drinking and cooking will either be obtained from a containerised Reverse Osmosis water purification system, using water from river abstraction, or will be supplied in bottles.

Storage capacity of 48 hours is recommended for each of the offices and the process plant. These storage facilities must be sufficiently elevated above the relevant points of delivery.

18.5.2 ELECTRICAL POWER SUPPLY

It is assumed that the main supply will eventually be taken off the local power lines, through a branch of overhead lines, for the offices. Power supply for the mining operations and processing will be from diesel powered generators.

Back-up diesel powered generators are also included for backup power for critical infrastructure and process equipment, and required buildings and communications systems.

18.5.3 SEWAGE TREATMENT PLANT

A localised sewer treatment, probably a containerised solution, is recommended for the offices as well as the three mine pits satellite offices.

18.5.4 WASTE MANAGEMENT FACILITIES

All solid wastes, with the exception of domestic waste, will be collected and transported off-site by a licensed contractor for appropriate recycle and disposal. Domestic wastes generated on-site at the administration areas will be incinerated on-site.

To facilitate the collection of solid wastes for off-site disposal, collection and sorting areas will be provided within a dedicated solid waste management building. No long-term, on-site storage areas were included as part of the Project.

18.6 MINE HAUL ROADS

Three gravel haul roads will be required to transport the ROM material from the Boin, Sewum, and Nyamebekyere open pit mine sites. The respective estimated lengths are 5 km, 6 km, and 7 km. Best fit alignments for these roads were done using the information as indicated in the site development above.

The Boin Haul road follows a slightly hilly topography through an area which includes both dense vegetation and farmland. Sewum Haul Road follows potions of the existing Sewum village gravel access road. Its topography and vegetation are similar to that of the Boin Haul Road. The topography and vegetation of the Nyamebekyere Haul Road are very hilly through dense rain forest. This route appears to be a greenfields alignment with no exiting roads, villages, or farms.

The approach used for deriving the mine haul roads costs was based on a bill of quantity (BOQ) drawn up based on long sections and a plan layout. The BOQ was applied to a set of rates which were built up from past experience and data from similar projects in Africa. Included in the costing are the following:

- Clearing and grubbing;
- Mass earthworks;
- Pavement layers of gravel material;
- Install prefabricated culvert at river (large);
- Install prefabricated culvert at river (small);
- Pitching and stonework against erosion;
- Gabions for erosion protection;
- Open and rehabilitate borrow areas;
- Single-stage crushing for sub base pavement layer material.

As part of the maintenance plan and costs it is estimated that the haul roads will be re-gravelled annually.

18.7 MINE PIT ACCESS ROADS

Three gravel access roads will be required for the operations between the pits and the waste piles at the Boin, Sewum, and Nyamebekyere open pit mine sites. Their respective estimated lengths are 4.2 km, 5.3 km, and 2.7 km. The same process was applied as for the haul roads when determining the alignments and costs.

The Boin access road follows a comparatively mild topography through an area which includes both dense vegetation and farmland. Sewum access road topography and vegetation are very hilly through both dense vegetation and farmland. The topography of the Nyamebekyere access road is comparatively mild through dense rain forest. This route also appears to be a greenfields alignment with no exiting roads, villages, or farms.

18.8 ACCOMMODATIONS

It has been assumed that no onsite accommodations are provided. Accommodations for expatriate and some senior staff will be provided by renting a number of houses in the nearby town of Enchi.

19 MARKET STUDIES AND CONTRACTS

19.1 MARKET STUDIES

Markets for doré are readily available and the doré bars produced from the Project could be sold on the spot market. Gold markets are considered mature.

The gold price used in this study is similar to other technical studies recently published (2014) and is between the 3-year trailing average.

19.2 CONTRACTS

There are no sales contracts on the Project.

20 ENVIRONMENTAL STUDIES, PERMITTING, AND SOCIAL OR COMMUNITY IMPACT

20.1 INTRODUCTION

WSP has undertaken an assessment of the environmental and social context associated with the Project area. The potential environmental and social issues, for consideration in the decision to take the project forward for a full Environmental and Social Impact Assessment (ESIA) to obtain authorisation for mining, have been identified as well as potential monitoring and management requirements. In addition, the associated regulatory requirements associated with the project are provided. On the basis of the high level understanding of the Project context and key environmental issues, closure and rehabilitation costs have been estimated.

As no site specific environmental studies have been undertaken to date, the information presented in this section is based on a desktop assessment of existing information relating to the Project and site, maps, and site photographs which have provided insight into current conditions.

20.2 ENVIRONMENTAL AND SOCIAL CONTEXT

20.2.1 PHYSICAL ENVIRONMENT

20.2.1.1 AIR QUALITY

The climatic setting is described in Section 5.3. As the project is located in a rural environment, the local air quality is anticipated to be good. Current emissions are likely to be limited to localised domestic sources such as fires used for cooking and vehicle movements (exhaust and dust emissions).

20.2.1.2 GROUND AND SURFACE WATER

The Project is underlain by crystalline igneous and metamorphic formations. These have little primary porosity, and therefore the presence of groundwater results from secondary porosity, i.e. jointing, shearing, fracturing and weathering, and give rise to weathered zone aquifers and fractured zone aquifers. The depths of aquifers are normally between 10 m and 60 m, and rarely yield more than 6 m^3 per year. Groundwater is likely to be the predominant source of water supply given the rural context of the project area. The town of Enchi, the district capital, obtains a reliable supply of potable water from groundwater pumped to homes and businesses in the town.

The Project is characterised by moderate topography, incised by river tributaries, and scattered flat plateaus. The Project is primarily drained by the Tano River and its tributaries, most notably the Disue. Unlike most of the major river systems in Ghana, this river drains towards the south west of the country and does not form part of the Volta River system, which covers nearly 70% of the country. Local communities and homestead are likely to rely on local rivers and streams for potable water for domestic and farming activities.

20.2.1.3 SOILS AND LAND CAPABILITY

The major soil types within the district are Forest Ochrosol and Forest Oxysol, which have developed from weathering of the metamorphosed rocks. A description of these soils is adapted from Centre for Policy Analysis (CEPA) Ghana Selected Economic Issues No. 3 2000 Soil Classification in Ghana.

- Forest Ochrosol soils are red, brown and yellow-brown in colour, and occur on the summits, upper, middle and lower slopes of the terrain. The upper horizons generally have a strong organic content, and strongly leached lower horizons. The first subgroup of the upland Forest Ochrosols (Wenchi series) is minor in extent, of low agricultural significance, and requires to be kept permanently under forest to maintain its structure and prevent erosion. The second subgroup (Bekwai series) (the most extensive subgroup within the semi-deciduous forest belt) is moderately shallow to moderately deep, with red and brown colouring. These soils occur over moderately undulating and to sloping topography, and consist of concretionary and/or gravelly, moderately heavy to medium textured soils overlying mostly highly weathered phyllite. The third subgroup (Akumadan series) is deep to very deep and red and brown in colour. They are well to moderately drained soils which are devoid of concretions and gravel at least to 60 cm and are moderately heavy to medium textured, and occur of the flatter areas of the uplands.
- Forest Oxysols are characterised by deeply weathered, yellow, moderately well drained, acid soils. They are generally medium to moderately heavy textured upland soils. These soils occur within the high rainfall areas of the extreme south-west of Ghana, and therefore are subject to high rainfall, and are therefore characterised by strongly leached soil profiles, with poor nutrient retention. Forest Oxysols are divided into three subgroups. The Boi series (overlying phyllite), Abenia series (overlying granite), and Tikobo series, which develops in tertiary sands and are mainly reddish brown to brown, well drained and medium in texture.

20.2.2 BIOPHYSICAL ENVIRONMENT

Whilst the Project is located within the moist tropical rainforest area of the Western Region of Ghana, the majority of the Project is disturbed through farming practices. Cocoa plantations are most prevalent, in additional to other locally grown food crops such as plantain, maize, cocoyam, cassava and rice. With the original vegetation cover in the majority of the Project having been removed, it is likely that secondary forest may only occur on steep slopes unsuitable for farming. Wood from these forested areas will be used as a source of domestic fuel and for use as building materials.

The northern part of the Project lies within forest reserves, with the majority of the area reserved for commercial timber plantation.

The Enchi National Park, characterised by wet evergreen forest, is located beyond the north-western and western boundary of the Project.

20.2.3 SOCIAL ENVIRONMENT

Enchi, the Aowin District capital, is the nearest town to the Project and has an estimated population of 9,270 people. The district as a whole is rural in nature, infrastructure is limited, and settlement limited to scattered towns and hamlets (single family compounds). There are educational and healthcare facilities in Enchi and a number of other towns in the district.

Current farming land use within the Project is likely to be characterised by subsistence and cash-crop agricultural practices. Key stakeholders, in respect of the Project, will be communities to utilise the Project are for farming activities and other resources such as firewood. Based on aerial photography, settlement appears to be sparse within the proposed mining operational areas, as such resettlement is consider to be unlikely and if required will be limited to small scale resettlement of individual hamlets.

Cultural and heritage aspects within the Project are likely to include local grave sites and cultural areas of importance.

Skilled and unskilled labour can be drawn on from the local pollution, particularly as a result of the regions mining history.

20.3 SUMMARY OF POTENTIAL ENVIRONMENTAL AND SOCIAL ISSUES

This section highlights the potential environmental and social issues that may be associated with the proposed mine operations. As the Project is in the PEA stage, the ESIA for the Project is pending. The potential issues identified are based on a desktop understanding of the environmental and social context as well as previous experience of mining operations.

- High storm water runoff as a result of high rainfall and steep topography are likely to increase the potential for soil erosion in operational areas which may result in contamination of water courses.
- Increased turbidity is likely to impact the functioning of the aquatic systems and water quality.
- Natural water systems may be impacted by increased heavy metal concentrations, acidification and changes in chemical characteristics from operational activities.
- Alterations in stream flow regimes and dynamics are likely to affect riparian and aquatic environments.
- Changes in water quality may have some impact on downstream users, in particular heavy metal accumulation in agricultural crops, and changes in soil nutrient availability due to alteration of the water pH.
- Endemic aquatic species are likely to be particularly vulnerable to changes in water quality.
- Acid mine drainage may present risk of impact to groundwater reserves as well as to surface water systems.
- Dewatering of mine areas may impact the groundwater availability of adjacent areas.
- Cyanide pregnant solution may permeate into ground water through a failure in the heap leach liner. Additionally cyanide pregnant solutions transmitted through pipelines and from stations from the heap leach facilities may impact on surface water quality.
- Release of untreated process plant water (in particular carbon-in-leach solution) to the environments likely to have impact of water quality of natural systems.
- Water from industrial support services such as workshops, are likely to contain hydrocarbons and heavy metals which are likely to impact surface and groundwater resources.
- Treated effluent from waste water treatment and water treatment works may have impact to water systems in terms of water quality and biological standards.

- Clearance of vegetation will expose soils to erosion with the operational area as a result of climatic elements (winds, rainfall).
- Any introduction of pesticides and herbicides may have a negative impact on flora and fauna.
- Reduction in connectivity of habitats may affect movements of wildlife species.
- Decrease in local air quality and a result of dust from mining and heavy vehicular movements on untarred roads. Impact of dust is likely to be localised to areas immediately adjacent to roadways and within the mine lease area, depending on the chemical composition of the mine dust health risks to the local population via inhalation and dermal exposure may increase.
- Noise of mining machinery and equipment may impact on any surrounding communities as well as on local fauna.
- Vibrations from blasting may affect the structural stability of localised dwellings, other buildings and infrastructure.
- Development of artisanal and illegal mining has the potential to introduce mercury into the region. Mercury may have long term impacts for the health of people and the environment.
- Development of the mine, its associated infrastructure and operations, residential areas and roadways may result in loss of biodiversity.
- Any communities and/or land use within the mine lease area is likely to require resettlement. As such there is likely to be an impact on the feeling of placement and livelihood for communities as intensification of land outside the mine lease area.
- Cultural heritage resources which may be situated within the mine lease area may be negatively affected.
- Immigration of people into the area is likely to have significant impact on the local communities in terms of increased competition for employment opportunities, social/cultural complications, changes in security and potential importation of diseases.
- Post mine closure is likely to have a negative impact on the community, due to their dependency on the mining activities in the region.

The most significant potential environmental and social issues are likely to be related to water management, social-economic impacts and post mine closure expectations. These issues are likely to either be of key concern to local communities and / or likely to have cost implications in respect of impact management during the operational and closure phases.

20.4 APPROACH TO ENVIRONMENTAL AND SOCIAL MANAGEMENT

Environmental management requirements for the mining operations will be incorporated into an Environmental Management Plan (EMP), which is submitted to the Government of Ghana for review and approval prior to commencement and every three years during the operational phase. The EMP is the mechanism for environmental approvals and seeks to address environmental and socio-economic component of the Project and includes impact identification, impact management and monitoring, environmental action plans, and a rehabilitation and closure plan.

Community management will need to be carried out through a range of initiatives, which aim to engage the community and understand their concerns and needs, while providing an approach to manage stakeholder’s expectations. Effective and early community engagement, to address issues such as social investment, local hiring, land access, and resource loss and associated compensation and livelihood restoration considerations, will be key determinant for the Project’s success.

An Environmental and Social Management Plan/System should be developed in accordance with the requirements and expectations of the International Finance Corporations Performance Standards (IFC PS; January 2012). Based on a desktop review of the Project, the following Performance Standards are determined to be applicable:

- Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts;
- Performance Standard 2: Labour and Working Conditions;
- Performance Standard 3: Resource Efficiency and Pollution Prevention;
- Performance Standard 4: Community Health, Safety, and Security;
- Performance Standard 5: Land Acquisition and Involuntary Resettlement;
- Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources;
- Performance Standard 8: Cultural Heritage.

Performance Standard 7: *Indigenous Peoples* may not apply because there are may be no indigenous people in the Project’s area of influence. Under the Performance Standards the terms ‘indigenous peoples,’ ‘indigenous ethnic minorities,’ ‘tribal groups,’ and ‘scheduled tribes’ describe social groups with a social and cultural identity distinct from the dominant society that makes them vulnerable to being disadvantaged in the development process.

Any ESIA, as well as the resultant Environmental and Social Management Plan/System should be prepared in accordance with applicable IFC Performance Standards and expectations; the IFC Environmental, Health and Safety Guidelines for Mining (December 2007); the International Cyanide Management Code; and any other relevant guideline or standard.

20.5 PERMITTING REQUIREMENTS

The Project will trigger a range of regulatory requirements and processes, which will require the application for, receipt of, and compliance with a variety of environmental permits and approvals from the relevant Ghanaian authorities. WSP have provided a high-level overview of the permitting and compliance requirements associated with the proposed Project.

20.5.1 ENVIRONMENTAL APPROVALS

Environmental legislation in Ghana is well developed and enforced by the Environmental Protection Agency (EPA). The overarching environmental legislation in Ghana is the Environmental Protection Agency Act (490 of 1994) (EPAA). Environmental Assessment Regulations (EAR) regulations are provided for by Legal Instrument 1652 of 1999 (LI 1652), which facilitates the regulation and monitoring of mineral operations within the country.

In line with the Mining Act (703 of 2006) environmental approvals are required to be obtained from relevant environmental agencies. Table 20.1 provides an overview of the primary environmental approvals needed for mining operations.

Table 20.1 Primary Environmental Approvals for Mining Operations

Legislation and Regulatory Institution	Approval Required
Environmental Assessment Regulations, 1999 (LI 1652) The Environmental Protection Agency is responsible for the enforcement of environmental regulations.	**Environmental Permit:** - In accordance with the Mining Act (Act 703 of 2006) and the Environmental Assessment Regulations, 1999 (LI 1652) of the EPA, a holder of a mineral right requires an Environmental Permit from the Environmental Protection Agency (EPA) in order to undertake any mineral operations **Environmental Management Plan Approval:** - An EMP must be submitted within 18 months of commencement of operations and updated every three years (Regulation 24 of LI 1652). **Environmental Certificate:** - This must be obtained from the EPA within 24 months of commencement of an approved undertaking (Regulation 22 of LI 1652) [a]. **Approved Reclamation Plan:** - Mine closure and decommissioning plans have to be prepared and approved by the EPA (Regulation 14 of LI 1652). **Reclamation bond:** - Mines must post a reclamation bond based on an approved reclamation plan (Regulation 22 of LI 1652).
Water Resources Commission Act, 1996 (Act 522) The Water Resources Commission (WRC) is responsible for the regulation and management of the use of water.	**Approvals for water usage** - Under Section 17 of the Mining Act (Act 703 of 2006), a holder of a mineral right may obtain, divert, impound, convey and use water from a watercourse or underground reservoir on the land of the subject of the mineral right, subject to obtaining the requisite approvals under Act 522. - This application must be undertaken in terms of Section 2 of the Water Use Regulations (LI 1692, 2001), and should be included in the environmental assessment and permit.
The Forest Protection Act, 2002 (Act 624) Regulated by the Forestry Commission	**Authorisation** - In accordance with Section 18 of the Mining Act (Act 703 of 2006), a holder of a mining right must obtain necessary approvals from the Forestry Commission. - These are generally for the destruction of trees within National Forest Reserves, but the Forestry Commission should be consulted with to confirm.

Note: a) To obtain the Environmental Certificate, the applicant will have to submit evidence of: (a) actual commencement of operations; (b) acquisition of other permits and approvals where applicable; and (c) compliance with mitigation commitments indicated in the environmental impact statement or preliminary environmental report;

The ESIA is the basis for the Environmental Permit (authorised by the EPA). The Environmental Impact Statement (EIS) must be submitted to the EPA for consideration, and should consider all aspects listed under Approval Requirements in Table 20.1.

Fees are required to be paid for the EPA process, which are dependent on the total Project value.

20.5.1.1 MINING REGULATIONS

In 2012 new regulations relating to the implementation of mining activities in Ghana were promulgated, including three relevant to the management of socio-economic aspects. These regulations are regulated by the Minerals Commission of Ghana. An overview is provided in Table 20.2.

Table 20.2 Mining Regulations Specific to Socio-Economic Aspects

Legislation	Relevance
Mining General Regulations 2012 (LI2173)	Promotes preferential employment of Ghanaians and preferential procurement of goods and services from Ghanaian service providers. Mines are required to develop the following localisation plans: **Recruitment and training plan** - including measures to be implemented to achieve the targets given in the regulations (no expatriates in unskilled positions and a only very small percentage of staff in other positions may be expatriates); and **Procurement plan** - including proposed targets for local procurement of goods and services.
Mines (Support Services) Regulations, 2012 (LI 2174)	Support services for mining operations should be sourced preferentially from Ghanaians
Mines (Compensation & Resettlement) Regulations, 2012 (LI 2175)	Pertains to planning and implementation of resettlement programmes. Includes the principles for compensation and requires that displaced people are resettled to suitable alternative land and that their livelihoods and living standards are improved. Details activities that should be undertaken to develop a resettlement plan, including stakeholder engagement. The resettlement plan must be approved by the District Assembly (Planning Authority), first and then by the Minister responsible for Mines. Affected people are resettled from the area before activity is undertaken in the area.

20.5.1.2 MONITORING REQUIREMENTS

Environmental Protection Agency

- Annual reports: Mines must submit annual environmental reports to the EPA.
- Inspections: The EPA undertakes regular inspections to ensure that mineral right holders are compliant with permit conditions and the environmental laws generally.
- Enforcement: The EPA is empowered to suspend, cancel or revoke an environmental permit or certificate and/or even prosecute offenders when there is a breach.

Water Resources Commission (WRC)

The monitoring and regulation of water resource use is provided for in the Water Use regulations (LI 1692, 2001). Full records must be kept by the permit holder of all water that is abstracted, diverted or stored. The WRC has power to inspect works and ascertain the amount of water abstracted.

Both the Water Resources Commission Act (Act 552 of 1996), and the Water Use regulations (LI 1692, 2001), provide for the enforcement of sanctions for breaches.

- Inspections: The WRC has power to inspect works and ascertain the amount of water abstracted.
- Enforcement: Both Act 522 and LI 1692 prescribe sanctions for breaches.

Forestry Commission

There are no generic requirements identified in the legislation, however the conditions of the Environmental Permit (obtained from EPA) may stipulate specific management and mitigation measures relating to Forestry resources.

Mining Commission

- Reporting:
  - monthly, six-monthly and annual reports on Ghanaian and expatriate staff numbers as well as information on payments of salaries and wages, royalty and corporate tax.
  - mines are also required to submit audited annual financial reports for review.

20.6 CLOSURE PLANNING

20.6.1 CLOSURE OBJECTIVES

Closure objectives should be defined early in the mine planning process and integrated into all activities throughout the life-of-mine. The aim of closure it to ensure that current and future impacts of mining are firstly avoided, then reduced and managed appropriately. High level closure objectives are outlined below:

- Achieve legal compliance as a minimum requirement.
- All areas are to be made stable and safe to humans and animals.
- Where possible, the land is to be returned to its pre-mining land use.
- The land is to be developed in accordance with the socio-economic demands of the local area and district.
- Impacts on the local community are to be minimised as far as possible.
- Closure must be undertaken in consultation with local communities, authorities, and employees.
- Current best practices are to guide the closure plan, and latest developments in mine rehabilitation sciences are to be considered.

20.6.2 CLOSURE OPTIONS AND END USES

The post-closure land use(s) should represent the Best Practicable Environmental Options and should balance the needs of the mining company, local communities and authorities. Defining the end use(s) requires consultation with all key stakeholders. Land rehabilitated and returned to its pre-mining conditions will have significant positive impacts on the sustainable livelihoods of the affected communities.

The pre-mining land-use is predominantly cocoa plantations in additional to other locally grown food crops. The land is significantly disturbed and ecological habitats already altered. The mine closure strategy should seek to restore the current land use activities and develop opportunities to provide protective ecological habitats thereby balancing local community needs and biodiversity enhancement.

Anticipated closure options in respect of the mine related infrastructure are presented in Table 20.3.

Table 20.3 High-Level Anticipated Closure Options

Component	**End of Life Closure Scenarios** (options listed in decreasing cost)
Open Mine Pits: Boin Nyamebekyere Sewum	Option 1: infilling of the open pits with the mine dump material (waste rock). The end use would be to return the land to a natural shape in line with the local topography, resulting in the restoration of the pre-mining land use (farming). Option 2: infilling of the open pits with water through the ingress of natural groundwater, rainfall and surface water runoff. The end use would be for water storage that could potentially support livestock and crop watering. Safety considerations during infill period i.e. fencing and access control.
Mine Dumps Boin Nyamebekyere Sewum	Option 1: mine dump material to be used to infill the open mine pits, resulting in the restoration of the mine pits areas to the pre-mining land use (farming). Option 2: waste rock dumps to be shaped to blend in with natural surroundings. Progressive and targeted re-vegetation to be implemented to stabilise the land form. Preparation of the land for restoration to pre-mining land use (farming of similar crops variants such as cocoa).
Mining-related infrastructure: Centralised heap leach facility (primary and secondary crusher; agglomerator; carbon plant; heap leach pads and ponds)	Option 1: Decontaminate (where required) dismantle and demolish all mining related infrastructure and rehabilitate the footprints to pre-mining conditions (farming of similar crops variants such as cocoa).

Component	**End of Life Closure Scenarios** (options listed in decreasing cost)
Non-mining related infrastructure: Operations camp – limited (offices, stores, workshops) Additional infrastructure - fuel station, explosive magazine, laboratory. Camp services – limited (water purification system and storage; localised sewage treatment and storage) Fencing	Option 1: Dismantle and demolish infrastructure (unless provision for handover to local communities is agreed to / planned for). Footprints are to be restored to pre-mining conditions.
Landfill (mine specific)	Option 1: Utilise existing Enchi landfill, as such no closure or rehabilitation implications.
Roads: Haul roads Operational roads (gravel / unpaved)	Option 1: Haul roads, which will be well constructed, will be retained for use by local communities after mine closure. Operational roads (pit access etc.) will be rehabilitated
Services: Power lines, water and sewer infrastructure	Option 1: Dismantle and demolish infrastructure. Option 2: Infrastructure to be retained for use by local communities after mine closure.
Human Resources	Development and implementation of: Employee strategy to manage the communication and consultation process Stakeholder strategy and liaison programme Engage with key stakeholders prior to and during closure.

Ideally the rehabilitation of mine dump facilities should occur progressively during the operational phase, especially as the Life of Mine is relatively short (nine years).

Rigorous physical monitoring and maintenance is to be undertaken typically for a three- to five-year period after closure. This must include water quantity and quality monitoring (covering surface water, groundwater and open pit water) and monitoring the success of the rehabilitation and re-vegetation of the tailings facilities, dumps and general areas.

21 CAPITAL AND OPERATING COSTS

21.1 INTRODUCTION

Capital and operating costs have been estimated for the proposed Project. These costs were developed in support of a projected cash flow for the operation, which would assess the financial viability of the project. The capital cost estimates are based on the PEA and address the engineering, procurement, construction, and start-up of the mine and processing facilities, as well as the ongoing sustaining capital costs. The operating cost estimate includes the cost of mining, processing, waste management, and related G&A services.

The capital and operating cost estimates were developed for a conventional open pit mine, heap leach process plant and supporting infrastructure for an operation capable of treating 3 million tonnes of material per annum.

The development of the contract mining costs was conducted using budgetary quotes and unit rates provided by three specialized contractors experienced in Ghana. WSP engineers used an average from two of the received quotes that better satisfied the project scope.

All costs are estimated in United States dollars (US$) as of Q4 2014 and, unless otherwise stated, are referred as "$".

21.2 COST ESTIMATE ACCURACY

The potential variance of the actual costs compared to the cost estimates developed in this analysis (the Cost Estimate Accuracy) is dependent upon the level of engineering, the estimating methodology, and the degree to which the project implementation activities have been estimated.

The Cost Estimate Accuracy of the Project capital cost estimate is within a +/-35% range of the overall project costs, as of Q4 2014.

21.3 EXCLUSIONS

The following were not included in this estimate.

- Costs associated with scope changes.
- Escalation beyond 2014 Q4.
- Financing costs.
- Cost associated with schedule delays such as those caused by:
  - scope changes;
  - unidentified ground conditions;
  - labour disputes.
- Accommodations for local labour.
- Environmental permitting activities.

- Permits.
- Sunk costs.

21.4 OWNER OPERATED OPTION SCENARIO

21.4.1 CAPITAL COSTS

21.4.1.1 CAPITAL COSTS SUMMARY

The estimate covers the direct costs of purchasing mining mobile fleet equipment, constructing the heap leach facility and infrastructure components of the Project. Indirect costs associated with the design, construction and commissioning of the new facilities, Owner's costs, and contingencies have also been estimated, based on percentages of the Direct Capital Cost Estimate. Risk amounts are specifically excluded from this estimate.

The total initial capital cost (CAPEX) to bring the plant into production is estimated at US$84 million. This initial capital cost is inclusive of US$14 million indirect costs and US$12 million contingency. With an additional total sustaining capital cost of US$39 million, including US$7 million indirect costs and US$5 million contingency, the total life of mine (LOM) CAPEX is US$123 million.

A summary of the initial and sustaining capital requirements is shown in Table 21.1.

Table 21.1 Summary of Project Capital Cost Estimate, Owner Operated Scenario

Description	Initial (Year 0 - 1) k US$	Sustaining (Year 2 – 9) k US$	Total k US$
Direct Costs	**58,777**	**26,625**	**85,401**
Mining	18,785	21,055	39,840
Processing	35,615	-	35,615
Infrastructures	4,377	2,751	7,128
Environment (closure)	-	18,265	18,265
Residual value (salvage)	-	(15,447)	(15,447)
Indirect Costs	**13,908**	**6,618**	**20,525**
EPCM	4,930	2,411	7,341
Construction Indirect	5,878	4,207	10,085
Owner's Cost	3,100	-	3,100
Total Capital Costs	**72,685**	**33,242**	**105,927**
Contingences	11,755	5,325	17,080
Total Capital Costs with contingencies	**84,440**	**38,567**	**123,007**

Note: Numbers may not add exactly due to rounding.

21.4.1.2 DIRECT CAPITAL COST ESTIMATES

Mining

The mining capital costs have been estimated based on an Owner Operated fleet that has been sized to fit the annual tonnage required to achieve the production schedule. As the Project advances, a trade-off study will need to be completed between Owner Operated versus Contract Mining. Contract Mining would reduce the upfront capital requirements but likely increase operating costs.

The Capital cost of the mobile equipment had been estimated based upon WSP's database. The Initial Capital is the equipment required for Year 1 production. Sustaining Capital includes additional equipment purchases to meet production targets as well as any equipment replacement requirements. The replacement capital requirements are minimized due to the relatively short mine life (<9 years). For example, the 60,000 hour equipment life assumption for haul trucks is not reached.

Table 21.2 summarizes the mining fleet capital requirements. The costs shown are direct costs presented without any contingency allowance.

Table 21.2 Summary of Mining Capital Cost Estimate, Owner Operated Scenario

Category	Initial Capital (Year 0 - 1) k US$	Sustaining Capital (Year 2 – 9) k US$	Total LOM k US$
Equipment Purchase	18,185	19,905	38,090
Drill	925	1,850	2,775
Shovel	2,720	2,720	5,440
Loader	1,700	0	1,700
Haul Truck	5,460	12,285	17,745
Dozer	2,115	1,335	3,450
Grader	660	660	1,320
Ancillary Equipment	1,180	530	1,710
Support Equipment	3,425	525	3,950
Engineering	150	0	150
Dewatering Allowance	200	400	600
Miscellaneous & Site Work	250	750	1,000
Total Direct Costs	**18,785**	**21,055**	**39,840**

Note: Numbers may not add exactly due to rounding.

Mineral Processing

A mechanical equipment list was developed using a 10,000 t/d design basis for the process flow diagram described in Section 17. Table 21.3 summarizes the process capital requirements. The capital cost estimates are based on budget pricing from suppliers, quantity take-offs from design criteria basic engineering, in-house data, and current market prices for smaller equipment component costs. The costs shown are direct costs presented without any contingency allowance and are based on equipment costs multiplied by factors to include installation costs.

Table 21.3 Summary of Process Capital Cost Estimate, Owner Operated Scenario

Category	Total LOM k US$
Primary Crushing	2,914
Secondary Crushing	3,230
Agglomeration	3,820
Heap Stacking	8,104
Heap Leach Pads	9,974
Ponds	1,458
Gold Extraction	4,499
Reagents	975
Services	642
Total Direct Costs	**35,615**

Note: Numbers may not add exactly due to rounding.

Infrastructure

Table 21.4 summarizes the infrastructure capital requirements. The costs shown are direct costs presented without any contingency allowance.

Table 21.4 Summary of Infrastructure Capital Cost Estimate, Owner Operated Scenario

Category	Total LOM k US$
Buildings	729
Access Roads	4,805
Boin	1,511
Sewum	2,054
Nyamebekyere	1,240
Site Access	806
Utilities	788
Total Direct Costs	**7,128**

Note: Numbers may not add exactly due to rounding.

Closure Cost

The closure cost estimates for the Project were estimated using the following approach.

- Gathering and collating the available engineering design information to develop the Project closure context.
- Obtaining the required additional information (where required), on infrastructural layouts and mine planning.

- Compiling a high-level bill of quantities (BoQ), or inventory, based on the available information for the projected closure scenarios on site.
- Determining applicable unit rates for the costing.
- Compiling costing spread sheets, structured in terms of the following categories:
  - infrastructural areas;
  - mining areas;
  - general surface rehabilitation;
  - water management;
  - post-closure aspects.

The cost estimate quantities were taken from available plans and maps available. Unit rates were obtained from the WSP database and/ or in historic consultation with demolition practitioners.

The high-level closure costs have been estimated based on preliminary infrastructure plan and the potential environmental issues likely to be associated with the proposed mining operations. An estimate of US$ 18.3 million (direct costs) has been assumed for the study. This is inclusive of an allowance for rehabilitation monitoring and care and maintenance, as well as surface water quality and groundwater quality monitoring, to be conducted for a minimum period of two to five years post closure. This is undertaken to ensure and assess the relative success of the implemented rehabilitation and closure measures.

21.4.1.3 INDIRECT CAPITAL COST ESTIMATES

A breakdown of the pre-production project Indirect Costs is provided in Table 21.1. Indirect Costs were estimated on the basis of past project experience ratios.

Engineering, Procurement, Construction Management (EPCM)

EPCM services were also factored from the direct costs and include project management & project controls, engineering services, and procurement services. The EPCM were estimated to 5% mining costs, 8% for processing costs, and 10% for infrastructure and final closure and remediation costs.

Construction Indirect

Construction indirect costs were factored from the total direct costs at 10% and are applied on initial capital and sustaining capital.

Construction indirect costs typically include first fill (mine, process, others), security, health and safety, environmental compliance, room and board, construction management staff (owner’s team), training, recruiting, lodging of employees, mobile and communication, internet, fuel cost for owners’ vehicles, repairs, ancillary equipment rental for construction (light towers, pumps, generators, etc.), utilities (water and waste).

Owner’s Costs

Owner’s costs includes expenses for the project to advance into pre-feasibility study (“PFS”) phase, such as exploration and assaying, metallurgical test work, geotechnical, environmental studies, geotechnical studies, topographic survey and engineering (PFS).

Contingency

Contingency is defined as additional capital costs allowed for over and above the base estimate, to account for unexpected items and unforeseen activities and requirements not anticipated in the cost estimate. Contingencies were factored from the total direct costs at 20% and are applied on initial capital and sustaining capital.

21.4.2 OPERATING COSTS

21.4.2.1 SUMMARY

Operating costs for the entire LOM period is estimated to US$ 382 million and US$ 67 million for the first two years of production. A total of approximately 149,700 ounces are anticipated to be produced during Year 1 and 2. Operating costs are summarized in Table 21.5 for the entire LOM period and in Table 21.6 for the first two years of production.

Cash Costs are also presented in the two tables below as a separate item, and include operation costs, royalties and refining charges. Cash Costs are estimated to US$ 432 million for LOM period and US$ 81 million for the first two years of production.

The operating costs and cash costs shown in this section are presented without any contingency allowance.

Table 21.5 Summary of Operating Cost Estimate (LOM), Owner Operated Scenario

Description	LOM k US$	Average Cost (LOM)		% of Total Costs
		US$/T Feed	US$/Oz	
Mining	227,268	9.19	422.08	52.6%
Processing	128,013	5.18	237.74	29.6%
Infrastructure	4,899	0.20	9.10	1.1%
Environment	554	0.02	1.03	0.1%
General and Administration	15,269	0.62	28.36	3.5%
Fees and Rights (Mineral Tenure and Ground Rent)	6,177	0.25	11.47	1.4%
Total - Operating Costs	**382,179**	**15.45**	**709.78**	**88.5%**
Royalties and Refining Charges	49,672	2.01	92.25	11.5%
Total Cash Costs (Operating + Royalties and Refining)	**431,851**	**17.46**	**802.03**	**-**

Note: Numbers may not add exactly due to rounding.

Table 21.6 Summary of Operating Cost Estimate for Year 1 and 2, Owner Operated Scenario

Description	Year 1 and 2 k US$	Average Cost (Year 1 and 2)		% of Total Costs
		US$/T Feed	US$/Oz	
Mining	35,093	7.02	234.42	43.3%
Processing	26,733	5.35	178.57	33.0%
Infrastructure	869	0.17	5.80	1.1%
Environment	124	0.02	0.83	0.2%
General and Administration	3,393	0.68	22.67	4.2%
Fees and Rights (Mineral Tenure and Ground Rent)	1,024	0.20	6.84	1.3%

Description	Year 1 and 2 k US$	Average Cost (Year 1 and 2) US$/T Feed	US$/Oz	% of Total Costs
Total - Operating Costs	**67,237**	**2.72**	**124.87**	**15.6%**
Royalties and Refining Charges	13,810	2.76	92.25	17.0%
Total Cash Costs (Operating + Royalties and Refining)	**81,046**	**16.21**	**541.39**	**-**

Note: Numbers may not add exactly due to rounding.

21.4.2.2 MINING

Operating costs assumed Owner Operated fleet. During the next stage of study, a trade-off study on the use of contractors should be investigated.

Table 21.7 summarizes the Mine Operating costs. These costs have been estimated from first principles on an annual basis by determining the requirements for the mobile equipment, manpower levels, services, and supplies to achieve the production schedule. Unit rates have been based on data gathered from similar operations, from WSP database, and other cost models available.

Table 21.7 Summary of Mining Operating Cost Estimate, Owner Operated Scenario

Category	Total LOM Cost Estimate k US$	Total LOM Cost Estimate US$ / T_{MINED}	% of Total Costs
Drilling	11,695	0.11	5%
Blasting	14,914	0.15	7%
Loading	19,444	0.19	9%
Hauling	113,036	1.10	50%
Mine Support	30,769	0.30	14%
Mine General	37,410	0.36	16%
Total	**227,268**	**2.21**	

Note: Numbers may not add exactly due to rounding.

Drilling and Blasting

The following assumptions have been made with regard to the Drilling and Blasting operating cost estimate:

- Oxide materials will not require drilling and blasting;
- Fifty percent (50%) of Transitional material and 100% of the Fresh material will require drilling and blasting;
- Include driller and drill helper labour costs, maintenance and repair costs (excludes maintenance labour which is accounted for under Mine General), fuel, lubricants, and supplies;
- Blasting costs include blast crew labour costs, explosive and blasting accessory costs, blast vehicle operating costs;
- Explosive costs assumed 75% loading using ANFO and 25% with emulsion.

Loading

The following assumptions have been made with respect to the Loading operating cost estimate:

- Includes costs for Primary Loading equipment - wheel loaders are accounted for under support equipment;
- Includes equipment operator labour cost, fuel, lubricants, and maintenance & repair costs.

Hauling

The following assumptions have been made with respect to the Hauling operating cost estimate:

- Includes equipment operator labour cost, fuel, lubricants, tires, and maintenance & repair costs.

Mine Support

The following assumptions have been made with respect to the Mine Support operating cost estimate:

- Includes equipment operator labour cost, fuel, lubricants, tires, and maintenance & repair costs for support equipment such as dozers, graders, utility equipment, water truck, and wheel loaders.

Mine General

The following assumptions have been made with respect to the Mine General operating cost estimate:

- Includes equipment operator labour cost, fuel, lubricants, tires, and maintenance & repair costs for equipment such as maintenance service vehicles, light vehicles, crew buses;
- Includes labour costs for Mine Supervision, Mine Maintenance, Mine Engineering, and Mine Management;
- Includes allowance for pit dewatering and grade control.

Fuel

For this study, fuel costs have been considered at a fixed rate of 1.20 US$/litre.

Labour

The manpower details were prepared and estimated by WSP for the purposes of this study, based on the estimated personnel for a 3 Mt/a open pit mining operation. Rates from other similar projects were considered for the purposes of the PEA mining plan. An additional 40% to the salaries was incorporated for health benefits, pension, overtime, training, travel, etc.

21.4.2.3 MINERAL PROCESSING

For the purposes of the PEA, processing operating costs, reagents, consumables, fuel, and power are based on similar heap leach operations. Manpower is based on the estimated personnel for a 3 Mt/a processing operation with 2,340 hours per year for staff and hourly plant crew. Rates from other similar projects were considered for the purposes of this study. An additional 40% to the salaries was incorporated for health benefits, pension, overtime, training, travel, etc. For the hourly plant crew, an additional 15% to the salaries was incorporated for overtime. Table 21.8 summarizes the Process Operating costs.

Table 21.8 Summary of Process Operating Cost Estimate, Owner Operated Scenario

Category	Total LOM Cost Estimate k US$	Total LOM Cost Estimate US$ / T Feed	% of Total Costs
Primary Crushing	7,419	0.30	6%
Secondary Crushing	11,128	0.45	9%
Agglomeration / Stacking	3,709	0.15	3%
Leach Operation (incl. sprinklers)	9,892	0.40	8%
Recovery Plant	13,381	0.54	10%
General Site Maintenance	11,128	0.45	9%
Cement for Agglomeration	24,729	1.00	19%
Cyanide, Lime, Other Reagents	7,419	0.30	6%
General & Administrative, Support	24,729	1.00	19%
Manpower	14,478	0.77	11%
Total	**128,013**	**5.18**	

Note: Numbers may not add exactly due to rounding.

21.4.2.4 INFRASTRUCTURE

The infrastructure section includes the gravel road maintenance. The equipment and labour operating cost items have been incorporated within the mining fleet costs. The estimate provides for the annual replacing of the wear course layer of the site gravel roads. Table 21.9 summarizes the estimated costs.

Table 21.9 Summary of Infrastructure Cost Estimate, Owner Operated Scenario

Item	Total LOM Cost Estimate k US$
Gravel Road Maintenance	4,899
Total	**4,899**

21.4.2.5 GENERAL AND ADMINISTRATIVE

The general services include general management (not included within mining and processing), accounting, human resources, purchasing, health and safety, environment, and security. Table 21.10 summarizes the cost estimate.

Table 21.10 Summary of General and Administrative Cost Estimate, Owner-Operated Scenario

Item	Total LOM Cost Estimate k US$
Salary and Wages	3,290
Expenses	11,979
Environmental Salary and Wages	401
Environmental Monitoring Expenses	153
Mineral Tenure Fees	6,177
Total	**21,999**

Note: Numbers may not add exactly due to rounding.

The study has assumed a staff level of 23. The expenses include a living cost allowance for expatriate and some senior level staff by renting several houses in the nearby town of Enchi.

Corporate Social Responsibility

Pinecrest acknowledges that a mining company in Ghana will participate to social development. The exact terms of such participation will be negotiated with government and local proponents. An allowance is included in the G&A cost estimate above.

21.5 CONTRACT MINING OPTION SCENARIO

The Contract Mining option scenario required changes to some of the above Capital and Operating cost estimates, mainly for the mining related activities. Some operation areas, such as processing and environmental (monitoring and compliance) will remain under the Owner's responsibilities. The following sections present the responsibilities of the Owner and the Contractor assumed for the economic evaluation.

Contractor costs were estimated based on budgetary quotes and unit rates provided by three specialized contractors experienced in Ghana. WSP engineers used an average from two of the received quotes that better satisfied the project scope.

21.5.1 OWNER'S AND CONTRACTOR'S RESPONSIBILITIES

21.5.1.1 CAPITAL COSTS

Owner's Responsibility

→ **Direct Costs:**

- Mining: 4 Light Vehicles purchase & replacement, software, communications.
- Processing: Costs unchanged from Owner Operated scenario.
- Infrastructure: Office blocks, assay lab, Mine Dry for process MP, water supply, water ponds (drainage), septic tank/field for non-mining infrastructure, electrical distribution, communication, IT.
- Environmental: Costs unchanged from Owner Operated scenario.

- Mine closure and rehabilitation:
  - Only moveable equipment and infrastructures are removed by Contractor;
  - Contractor assumes nominal site clean-up;
  - Costs unchanged from Owner Operated scenario.

→ **Indirect Costs:**

- EPCM:
  - Mining: in the Owner Operated scenario, this item was estimated based on a percentage of the capital costs. Because most capital costs are transferred to operating costs in this scenario, a fixed costs for initial EPCM (Y0) was estimated and applied a percentage at Y1 onward.
  - Processing: estimate unchanged from Owner Operated scenario.
  - Infrastructure: most capital cost remains as a capital item, either within the "Site Establishment" for contractor or “Site Infrastructures” for Owner. The percentage used to estimate remains unchanged from the Owner Operated scenario.
  - Environmental: estimate unchanged from Owner Operated scenario.
- Construction Indirect:
  - Mining: Because most of the capital costs are transferred to operating costs in this scenario, an estimate of 50% of the construction Indirect Costs from the Owner Operated scenario was assumed to be incurred for the Contract Mining scenario. There would be savings mainly in First Fill and training.
  - Processing: estimate unchanged from Owner Operated scenario.
  - Infrastructure: most capital cost remains as a capital item, either within the "Site Establishment" for Contractor or “Site Infrastructures” for Owner: The percentage used to estimate remains unchanged from the Owner Operated scenario.
  - Environmental: estimate unchanged from Owner Operated scenario.
- Owner's costs:
  - Costs unchanged from Owner Operated scenario.
- Contingencies:
  - Estimation method unchanged from Owner Operated scenario.

Contractor's Responsibility

The mining contractor would provide all the administration and maintenance facilities to support mining activities. They would also remove all the equipment and movable buildings at the end of the project. The mobilization and demobilization costs are thus included as a Capital expenditure.

21.5.1.2 OPERATING COSTS

Owner's Responsibility

→ Engineering, management.

→ Fuel, tires, maintenance for Owner’s equipment and vehicles (ex.: light vehicles).

- Processing costs.
- Process related infrastructure costs.
- Environmental (monitoring, compliance).
- General & Administrative: nursing, non-contractor employees, site maintenance (electricity and plumbing), HR for non-contractor activities, IT, social and corporate responsibilities (SCR).
- Water supply.
- Power for Contractor's buildings: allowance of US$ 50K/year.
- Mineral tenure and royalties.

Contractor's Responsibility

- All mining related activities including maintenance.
- Cost related to Contactor's infrastructures except power and water supply.
- Road maintenance (excluding Enchi existing road).
- Monthly management fees included in Contractor’s "Mining OPEX".

21.5.2 CAPITAL COSTS

21.5.2.1 CAPITAL COSTS SUMMARY

The total initial Capital cost (CAPEX) to bring the plant into production is estimated at US$ 62 million. This initial Capital cost is inclusive of US$ 13 million Indirect costs and US$ 8 million contingency. With an additional total sustaining Capital cost of US$ 22 million, including US$ 5 million Indirect costs and US$ 3 million contingency, the total life of mine (LOM) CAPEX is US$ 84 million.

A summary of the initial and sustaining capital requirements are shown in Table 21.11.

Table 21.11 Summary of Project Capital Cost Estimate, Contract Mining Scenario

Description	Initial (Year 0 - 1) US$ K	Sustaining (Year 2 – 9) US$ K	Total US$ K
Direct Costs	**40,710**	**14,456**	**55,166**
Mining	378	946	1,325
Processing	35,615	-	35,615
Infrastructures	4,717	2,418	7,135
Environment (closure)	-	18,265	18,265
Residual value (salvage)	-	(7,174)	(7,174)
Indirect Costs	**12,702**	**5,087**	**17,789**
EPCM	4,630	1,966	6,596
Construction Indirect	4,972	3,121	8,094
Owner's Cost	3,100	-	3,100
Total Capital Costs	**53,412**	**19,543**	**72,956**
Contingences	8,142	2,891	11,033
Total Capital Costs with contingencies	**61,555**	**22,435**	**83,989**

Note: Numbers may not add exactly due to rounding.

21.5.2.2 DIRECT CAPITAL COST ESTIMATES

Mining

Table 21.12 summarizes the mining related capital requirements for the Contract Mining scenario. The costs shown are direct costs presented without any contingency allowance.

Table 21.12 Summary of Mining Capital Cost Estimate, Contract Mining Scenario

Category	Total LOM US$ K
Contractor Mobilization / Demobilization	665
Owner's Vehicles & Equipment	510
Owner's Engineering & Miscellaneous	150
Total Direct Costs	**1,325**

Note: Numbers may not add exactly due to rounding.

Mineral Processing

There is no change to the Process Capital Estimate. Refer to Table 21.3.

Infrastructure

Table 21.13 summarizes the infrastructure related capital requirements for the Contract Mining scenario. The costs shown are direct costs presented without any contingency allowance.

Table 21.13 Summary of Infrastructure Capital Cost Estimate, Contract Mining Scenario

Category	Total LOM US$ K
Buildings (supplied by Owner)	233
Utilities (supplied by Owner)	788
Buildings & Utilities (supplied by Contractor)	1,691
Access Roads (by Contractor)	3,565
Site Access (by Contractor)	858
Total Direct Costs	**7,135**

Note: Numbers may not add exactly due to rounding.

Closure Cost

There is no change to the Closure Cost estimate.

The mining contractor is responsible for removing all its equipment and movable or modular buildings and remove scrap and debris of all the areas its operations disturbed.

21.5.3 OPERATING COSTS

21.5.3.1 SUMMARY

Operating costs for the entire LOM period is estimated to US$ 468 million. Operating costs are summarized in Table 21.14 for the entire LOM period.

Cash costs are also presented in the table below as a separate item, and include operation costs, royalties and refining charges. Cash costs are estimated to US$ 518 million for LOM.

The Operating costs and Cash costs shown in this section are presented without any contingency allowance.

Table 21.14 Summary of Operating Cost Estimate (LOM), Contract Mining Scenario

Description	LOM US$ K	Average Cost (LOM)		% of Total Costs
		US$/T Feed	US$/oz	
Mining	317,480	12.84	590	61.3
Processing	128,013	5.18	238	24.7
Infrastructure	445	0.02	1	0.1
Environment	554	0.02	1	0.1
General and Administration	15,269	0.62	28	2.9
Fees and Rights (Mineral Tenure and Ground Rent)	6,177	0.25	11	1.2
Total - Operating Costs	**467,937**	**18.92**	**869**	**90.4**
Royalties and Refining Charges	49,672	2.01	92	9.6
Total Cash Costs (Operating + Royalties and Refining)	**517,609**	**20.93**	**961**	**100**

Note: Numbers may not add exactly due to rounding.

21.5.3.2 MINING

During the next stage of study, a trade-off study on the use of contractors should be investigated.

Table 21.15 summarizes the mine Operating cost. These costs have been estimated from average unit rates and budget quotes provided by two specialized mining contractors.

Table 21.15 Summary of Mining Operating Cost Estimate, Contract Mining Scenario

Category	Total LOM Cost Estimate US$ K	Total LOM Cost Estimate US$ / T_{MINED}	% of Total Costs
Mining Contractor OPEX	306,051	2.98	96
Drilling & Blasting	74,045	0.72	23
Loading & Hauling	168,951	1.64	53
Monthly Management Fee	62,059	0.60	20
Owner's OPEX	11,429	0.11	4
Total	**317,480**	**3.09**	**100**

Note: Numbers may not add exactly due to rounding.

Owner's OPEX

The following assumptions have been made with respect to the mine general Operating cost estimate:

- Includes fuel, tires, and maintenance & repair costs for owner's equipment such as light vehicles;
- Includes labour costs for Mine Engineering and Mine Management;

→ Includes allowance for consultants and grade control.

21.5.3.3 MINERAL PROCESSING

There is no change to the Process Operating Estimate. Refer to Table 21.8.

21.5.3.4 INFRASTRUCTURE

The infrastructure section includes an allowance for power for Contractor buildings. The gravel road maintenance has been assumed included within the Contract Mining OPEX item. Table 21.16 summarizes the cost estimate for this section.

Table 21.16 Summary of Infrastructure Cost Estimate, Contract Mining Scenario

Item	Total LOM Cost Estimate US$ K
Power Allowance	445
Total	**445**

21.5.3.5 GENERAL AND ADMINISTRATIVE

There is no change to the General and Administrative Estimate. Refer to Table 21.10.

21.6 COST COMPARISON: OWNER OPERATED VS. CONTRACT MINING

21.6.1 CAPITAL COST

Table 21.17 presents a comparison between the Capital costs of the Owner Operated scenario and the Contract Mining scenario. The initial Capital cost (including contingencies) of the Contract Mining scenario is approximately 27% lower than the Owner Operated scenario.

Table 21.17 Comparison of Project Capital Cost (US$ K)

Description	Owner Operated	Contract Mining
Direct Costs	**58,777**	**40,710**
Mining	18,785	378
Processing	35,615	35,615
Environment (Mine Closure and Rehabilitation)	-	-
Infrastructure	4,377	4,717
Residual Value (Salvage)	-	-
Indirect Costs	**13,908**	**12,702**
EPCM	4,930	4,630
Construction Indirect	5,878	4,972
Owner's Costs	3,100	3,100
Total Capital Costs	**72,685**	**53,412**
Contingencies	11,755	8,142

Total Initial Capital Costs with contingencies	**84,440**	**61,555**
Total Sustaining Capital with contingencies	**38,567**	**22,435**
Total LOM Project Capital with contingencies	**123,007**	**83,989**

21.6.2 OPERATING COST

Table 21.18 presents a comparison between the Project Operating Costs of the Owner Operated scenario with the Contract Mining scenario. The total cash costs (Site Operating costs + Royalties and Refining Charges) of the Contract Mining scenario is approximately 20% higher than the Owner Operated scenario.

Table 21.18 Comparisons of Project Operating Costs (LOM)

	Average Operating Cost - LOM (US$/T. Feed)	
Description	**Owner Operated**	**Contract Mining**
Mining	9.19	12.84
Processing	5.18	5.18
Environment and Infrastructure	0.22	0.04
General and Administration, including Mineral Tenure Fees	0.87	0.87
Total - Operating Costs	**15.45**	**18.92**
Royalties and Refining Charges	2.01	2.01
Total Cash Costs (Operating + Royalties and Refining)	**17.46**	**20.93**

22 ECONOMIC ANALYSIS

22.1 INTRODUCTION

This PEA is preliminary in nature. The economic analysis presented in this section is based entirely on Inferred Mineral Resources. There is no certainty that this PEA, which is based on these Inferred Mineral Resources, will be realized.

A preliminary economic analysis has been carried out for the Project by Jean-Sébastien Houle, Eng. using a cash flow model. The model is constructed using annual cash flows by taking into account annual processed tonnages and grades for the heap leach feed. The associated process recoveries, metal prices, operating costs and refining charges, royalties and capital expenditures (both initial and sustaining) were also taken into account. The price forecast of gold is given in US$. As a general rule, the financial assessment of projects of this nature is carried out on a "100% equity" basis i.e. the debt and equity sources of capital funds are ignored. No provision is made for the effects of inflation. Results are given before and after taxation. Current Ghana tax regulations are applied to assess the corporate and mining tax liabilities. All amounts in this section are presented in US$ in the fourth quarter of 2014 and, unless otherwise stated, are referred to "$".

Discounting has been applied from the first year of mine construction (Year 0 onward).

The model reflects the base case and technical assumptions shown in the foregoing sections of this report.

The taxation analysis for the base case of this economic analysis was carried out with the accounting firm Raymond Chabot Grant Thornton. They also provided information pertaining to local mining regulation.

This PEA restates the economic analysis for the Owner Operated scenario and presents an additional economic analysis for the Contract Mining option scenario. The cost centers attributed to the mining contractor and those remaining under the Owner responsibility are presented in Section 21.

Section 22.6 presents a comparison of the financial results with the original "Owner Operated" results (WSP 2015, issue date June 2015).

22.2 ASSUMPTIONS

The assumptions used in the economic analysis are summarized in Table 22.1. The price forecast of gold has been discussed in Section 19.0. Heap leach throughput for Year 1 is reduced at 2.0 Mt/a to account for typical operating ramp up period. The assumptions for the gold and diesel prices as well as the exchange rates are the same as the original PEA and are effective as of December 2014. The author kept the same assumptions to allow a comparison with the original "Owner Operated" financial results (issue date, June 2015).

Table 22.1 Technical Assumptions

Description	Units	Value
Heap leach Throughput – Year 1	Mt/a	2.0
Heap leach Throughput – Year 2-9	Mt/a	3.0
Gold Price	US$/troy oz.	1,300
Discount Rate	%	5
Diesel Fuel Price	$/l	1.20
Corporate Income Tax Rate	%	35
Depreciation	%	20
Government Participation on Project	%	10
Refining Charges, Doré Transport and Insurance	US$/troy oz.	1.25

22.2.1 CAPITAL EXPENDITURES

Capital expenditures for the Project have been scheduled according to the execution schedule with the bulk of the expenditure happening within the two years prior to production. Sustaining capital for the mining fleet, leach pad expansion, and future haul roads have also been included in the Capital expenditures.

22.2.2 PROJECT EXPLOITATION PERMITS

Upon grant of the exploitation permit, and in accordance with Mining Regulation, the Government of Ghana is entitled to retain a 10% free carried equity interest in the Project, which interest may not be diluted even if there is an increase in the share capital, under Section 8 of the Ghanaian Mining Act. The 10% equity interest is paid to the government when a dividend is declared.

The Government of Ghana is also entitled to collect a 5% royalty (calculated based on the international market value of gold) on the revenues from gold production on the Property covered by the exploitation permit. The Government also collects various taxes and duties on the importation of fuels, supplies, equipment, and outside services as specified in the Mining Code.

22.2.3 ROYALTIES

The present economic analysis incorporates a royalty agreement with Red Back Mining Ghana, a subsidiary of Kinross Gold. This agreement consist of a 2% NSR royalty of which 1% is subject to a buy-back option for a lump-sum of $3.5 M. The buy-back option has been assigned to Sandstorm Gold Ltd. and thence, the economic analysis considers royalties in full for the entire mine life.

22.2.4 DEPRECIATION

Depreciation allowance is considered at a rate of 20% over five years and it accumulates in the Capital expenditures tax pool if it is not utilized within the qualifying year of assessment. The remaining Capital asset tax pool is fully deductible in the final year of production.

22.2.5 INFLATION

In line with the practice in the mineral industry, no inflation was applied to the cash flow analysis.

22.2.6 CURRENCY

Cash flow analysis is reported in United States Dollars (US$) and where applicable the exchange rates shown in Table 22.2 were used.

Table 22.2 Exchange Rate (Bank of Canada, December 2014)

Description	Units	Value
United States	CA$/US$	1.1533
Europe	CA$/EUR	1.4218
Ghana	CA$/Cedi	0.3590
South Africa	CA$/Rand	0.1003

22.2.7 SALVAGE VALUE

For the Owner Operated Scenario, the Project equipment salvage value has been assumed at 20% on the following costs:

- Mining fleet (including sustaining costs);
- Processing mechanical equipment;
- Electrical and communications;
- Fuel storage facility;
- Site vehicles and mobile equipment.

For other infrastructures such as buildings with structural steel and sheeting, plate works, and modular buildings, the salvage value is assumed at 5%.

There is no salvage value for earth works or remediation works.

For the Contract Mining Scenario, the estimate of salvage value was reduced to reflect that the Contractor would be providing the majority of the mining fleet.

22.2.8 DIESEL PRICE

A diesel price of US$1.20 per litre was used in the economic evaluation. The diesel price was based on references available for similar projects.

22.2.9 OPERATING COSTS

During the last year of production, since the actual heap leach throughput would be less than 75 % of the 3 Mt/a nominal throughput, a reduction of all constant annual operating costs (such as infrastructure cost and G&A) was applied for the last year. All Operating cost items expressed in “$/year” were reduced by 10%.

22.2.10 MINERAL TENURE FEES

Ghana requires the payment of annual fees for mining rights and ground rents (occupation of land). The mining rights apply on the entire claims with mining activity at $700 per 21 hectares for the first two years, then $1,000 per 21 hectares from the third year onward. The ground rent applies to the total surface of disturbed areas for a fee of 9,019 cedi per square kilometer (approximately $2,807/km²).

22.3 FINANCIAL MODEL AND RESULTS

22.3.1 OWNER OPERATED SCENARIO

The technical parameters, production forecasts, and estimates described elsewhere in this report are reflected in the LOM Project cash flow model in Table 22.3.

Figure 22.1 shows the pre-tax cash flows as well as the cumulative cash flow over the Project's life. Figure 22.2 shows the post-tax cash flows as well as the cumulative cash flow over the Project's life. The payback period corresponds to the time at which the cumulative cash flow becomes positive: during Year 2 for the pre-tax model and during Year 3 for the post-tax.

The cash flows occurring in Years 12 to 14 are expenses for environmental monitoring ($133,000/year) following final closure of the mine.

Figure 22.1 Pre-tax Cash Flows and Cumulative Cash Flow, Owner Operated Scenario

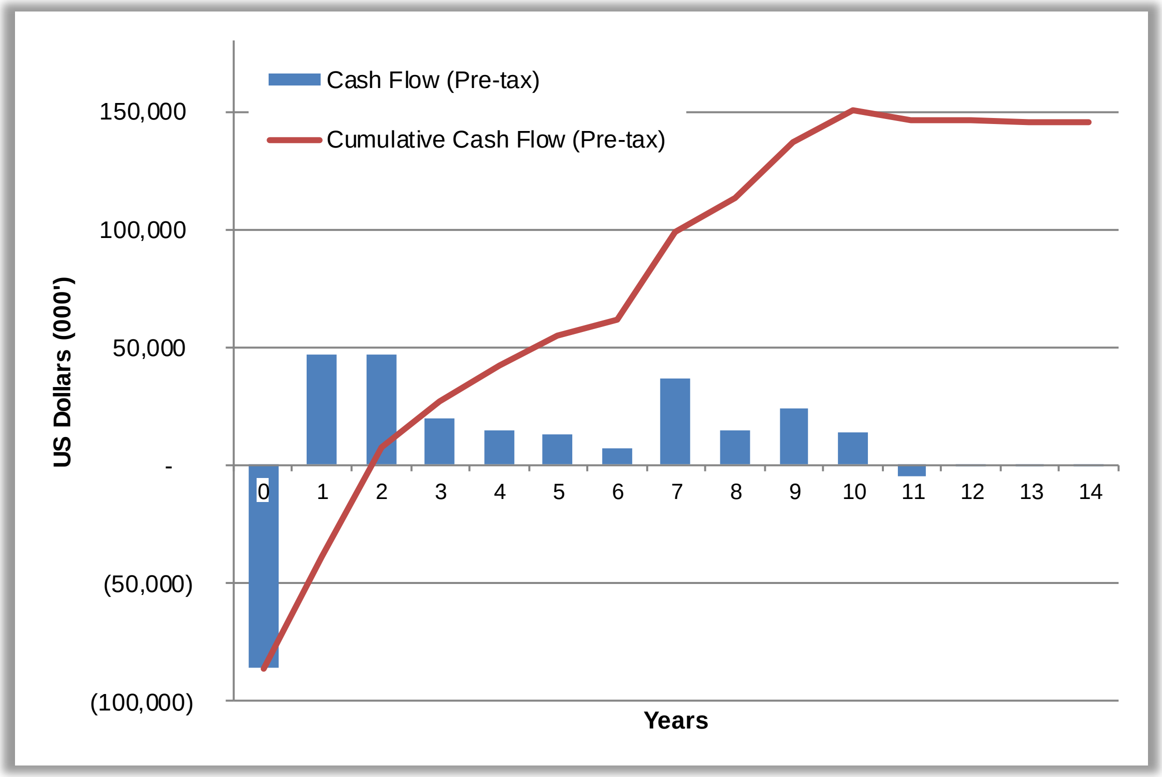


Figure 22.2 Post-tax Cash Flows and Cumulative Cash Flow, Owner Operated Scenario

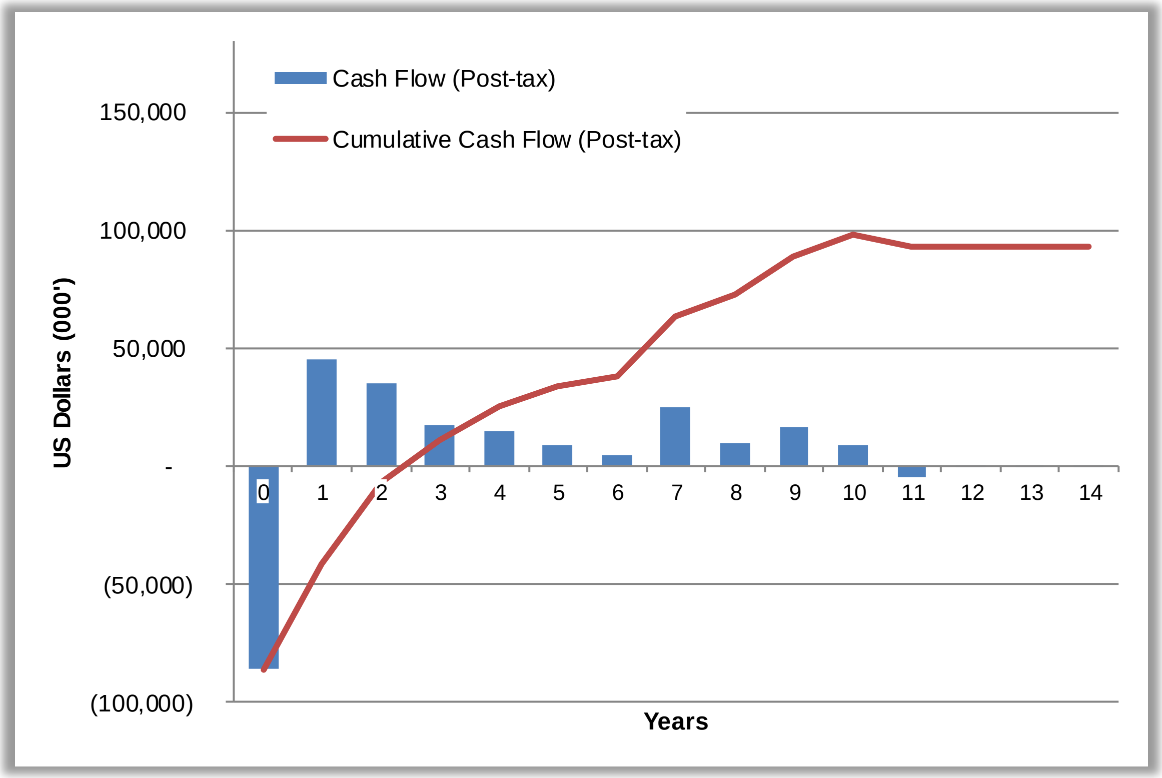


Table 22.3 Cash Flow Statement, Owner Operated Scenario

ITEM Description	unit	TOTAL	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Mining																		
Total Material Mined	T '000	102,751	-	6,317	12,749	12,225	12,496	12,777	13,486	12,653	12,369	7,678	-	-	-	-	-	-
Strip Ratio	w: HL	3.16	-	2.16	3.25	3.07	3.17	3.26	3.50	3.22	3.79	2.58	-	-	-	-	-	-
Waste Rock	T '000	78,021	-	4,317	9,749	9,225	9,496	9,777	10,486	9,653	9,785	5,533	-	-	-	-	-	-
Heap Leach Feed	T '000	24,729	-	2,000	3,000	3,000	3,000	3,000	3,000	3,000	2,584	2,145	-	-	-	-	-	-
Heap Leach Feed grade	g/T	0.91	-	1.52	1.05	0.74	0.71	0.75	0.70	1.05	0.88	0.97	-	-	-	-	-	-
Heap Leach Feed - Ounces	Oz.	720,858	-	97,987	101,741	71,570	68,948	71,959	67,091	101,036	73,429	67,098	-	-	-	-	-	-
Gold Production	**Oz.**	**538,450**	**-**	**73,490**	**76,210**	**53,677**	**51,711**	**53,949**	**50,230**	**74,460**	**54,777**	**49,945**	**-**	**-**	**-**	**-**	**-**	**-**
REVENUES																		
Gold Doré (gross revenues)	USD '000	699,984	-	95,537	99,073	69,781	67,225	70,133	65,299	96,798	71,210	64,929	-	-	-	-	-	-
Refining charges, doré transport and insurances	USD '000	673	-	91.86	95.26	67.10	64.64	67.44	62.79	93.07	68.47	62.43	-	-	-	-	-	-
Royalties	USD '000	48,999	-	6,687.59	6,935.13	4,884.64	4,705.72	4,909.33	4,570.93	6,775.85	4,984.69	4,545.02	-	-	-	-	-	-
Net Revenues	USD '000	**650,312**	**-**	**88,758**	**92,043**	**64,829**	**62,454**	**65,157**	**60,665**	**89,929**	**66,157**	**60,321**	**-**	**-**	**-**	**-**	**-**	**-**
Operating Costs																		
Mining	USD '000	227,268	1,771	12,090	23,004	24,533	26,449	28,995	32,187	29,920	30,210	18,111	-	-	-	-	-	-
Processing	USD '000	127,554	-	10,889	15,843	16,075	15,932	15,739	15,053	14,599	13,304	10,121	-	-	-	-	-	-
Environmental	USD '000	498	-	62	62	62	62	62	62	62	62	-	-	-	-	-	-	-
Site Infrastructures	USD '000	4,391	-	259	610	534	534	534	534	823	564	-	-	-	-	-	-	-
General and Administration	USD '000	15,269	-	1,697	1,697	1,697	1,697	1,697	1,697	1,697	1,697	1,697	-	-	-	-	-	-
Mineral Tenure Fess and Rights	USD '000	6,177	-	512	512	725	725	725	725	725	725	725	16	16	16	16	16	-
Total Operating Costs	USD '000	381,157	1,771	25,509	41,728	43,625	45,399	47,751	50,257	47,825	46,561	30,653	16	16	16	16	16	-
Total Operating Costs	USD/oz.	708	24	335	777	844	842	951	675	873	932	-	-	-	-	-	-	-
Total Cash Cost (Operating + Refining and Royalties)	USD '000	430,829	1,771	32,288	48,758	48,577	50,169	52,728	54,891	54,694	51,615	35,261	16	16	16	16	16	-
Total Cash Cost (Operating + Refining and Royalties)	USD/oz.	800	24	424	908	939	930	1,050	737	998	1,033	-	-	-	-	-	-	-
CAPITAL COSTS																		
Direct Costs																		
Mining	USD '000	39,840	18,785	11,055	2,440	1,365	1,515	3,395	1,285	-	-	-	-	-	-	-	-	-
Processing	USD '000	35,615	35,615	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Infrastructure	USD '000	7,128	4,377	1,511	-	-	-	-	1,240	-	-	-	-	-	-	-	-	-
Environmental	USD '000	18,265	-	-	-	-	-	-	-	3,573	3,573	3,573	3,573	3,573	133	133	133	-
Salvage values	USD '000	(15,447)	-	-	-	-	-	-	-	-	-	-	(15,447)	-	-	-	-	-
Sub-Total - Direct Costs	USD '000	85,401	58,777	12,567	2,440	1,365	1,515	3,395	2,525	3,573	3,573	3,573	(11,874)	3,573	133	133	133	-
Indirect Costs		-																
EPCM	USD '000	7,341	4,930	122	68	76	170	188	357	357	357	357	357	-	-	-	-	-
Construction Indirect	USD '000	10,085	5,878	1,257	244	137	152	340	253	357	357	357	357	357	13	13	13	-
Owner's Costs	USD '000	3,100	3,100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sub-total - Indirect Costs	USD '000	20,525	13,908	1,379	312	212	321	528	610	715	715	715	715	357	13	13	13	-
Total Capital Costs	**USD '000**	**105,927**	**72,685**	**13,945**	**2,752**	**1,577**	**1,836**	**3,923**	**3,135**	**4,288**	**4,288**	**4,288**	**(11,160)**	**3,930**	**147**	**147**	**147**	**-**
Contingencies on direct costs		17,080	11,755	2,513	488	273	303	679	505	715	715	715	(2,375)	715	27	27	27	-
Total Capital Costs and Contingencies	**USD '000**	**123,007**	**84,440**	**16,458**	**3,240**	**1,850**	**2,139**	**4,602**	**3,640**	**5,002**	**5,002**	**5,002**	**(13,535)**	**4,645**	**173**	**173**	**173**	**-**
TOTAL OPERATIONAL AND CAPITAL COSTS	**USD '000**	**504,164**	**86,211**	**41,967**	**44,968**	**45,475**	**47,538**	**52,352**	**53,897**	**52,827**	**51,564**	**35,656**	**(13,519)**	**4,661**	**189**	**189**	**189**	**-**
PRE-TAX CASH FLOW	USD '000	146,148	(86,211)	46,790	47,075	19,353	14,916	12,804	6,768	37,102	14,593	24,666	13,519	(4,661)	(189)	(189)	(189)	-
CUMULATIVE PRE-TAX CASH FLOW	USD '000		(86,211)	(39,421)	7,654	27,008	41,924	54,728	61,496	98,598	113,191	137,857	151,376	146,715	146,526	146,337	146,148	146,148
DISCOUNTED PRE-TAX CASH FLOW @ i = 5%	USD '000	102,540	(86,211)	44,562	42,698	16,718	12,272	10,032	5,051	26,368	9,877	15,900	8,300	(2,725)	(105)	(100)	(95)	-
PRE-TAX INTERNAL RATE OF RETURN	**%**	**34.1%**																
PRE-TAX NET PRESENT VALUE (NPV) @ i = 5%	**USD '000**	**102,540**																
TAXES, DEDUCTIONS AND AMORTIZATIONS																		
Corporate Income Taxes (CIT)	USD '000	52,982	-	2,064	12,165	1,991	384	4,180	2,466	12,370	4,587	8,219	4,555	-	-	-	-	-
POST-TAX CASH FLOW	USD '000	93,167	(86,211)	44,726	34,910	17,362	14,532	8,624	4,302	24,732	10,006	16,447	8,964	(4,661)	(189)	(189)	(189)	-
CUMULATIVE POST-TAX CASH FLOW			(86,211)	(41,485)	(6,576)	10,787	25,318	33,943	38,245	62,977	72,983	89,430	98,394	93,734	93,545	93,356	93,167	93,167
DISCOUNTED POST-TAX CASH FLOW @ i = 5%	USD '000	62,399	(86,211)	42,596	31,664	14,998	11,955	6,757	3,211	17,577	6,772	10,602	5,503	(2,725)	(105)	(100)	(95)	-
POST-TAX INTERNAL RATE OF RETURN	**%**	**25.2%**																
POST-TAX NET PRESENT VALUE (NPV) @ i = 5%	**USD '000**	**62,399**																

The cash flow statement shows both the proceeds from the gold sale on spot market (net of royalties and refining charges) and the gold doré gross value (excluding refining charges and royalties). The former is required in the Ghanaian mineral tax assessment.

The Operating costs are listed by component and include mineral tenure fees. The “cash costs” include the royalty payment and refining charges.

The estimated closure costs must be secured by a guarantee composed, in a proportion of 50/50 %, of a trust fund and a bond at the beginning of mining operations. The bond is reimbursed gradually upon completion of progressive closure work. The trust fund is reimbursed once the final closure and remediation is completed and approved by the government of Ghana. From WSP’s understanding, guarantees are secured by the mother company and have thus been considered to be handled at the corporate level and excluded from the project cash flow model.

Based on the information available, all real (immovable) property holdings must be returned to the proper Ghanaian authorities at the end of mining activities. However, as mentioned in Section 20.5, the mine will be completely dismantled and remediated once its activities have ceased. Globally, if some of all real property holdings are returned to Ghanaian authorities, the closure cost and credits for salvage values will be reduced to a certain proportion. For the purpose of the cash flow model, both approaches will give similar LOM results.

The financial results of the Project are summarized in Table 22.4. On a pre-tax basis, the Project has a Net Present Value (NPV) of US$ 102M at a discount rate of 5 %, an Internal Rate of Return (IRR) of 34%, and a payback period of 2.8 years. On a post-tax basis, the NPV is US$62 M at a discount rate of 5 %, the IRR is-25%, and the payback period is 3.4 years.

Table 22.4 Summary of Financial Results, Owner Operated Scenario

Description	Units	LOM
Tonnage Feed	T' 000	24,729
Feed Grade Processed	g/T	0.91
Gold Recovery (average)	%	74.7%
Production Period	Years	8.72
Tonnage Waste Rock	T' 000	78,021
Stripping Ratio	W/O	3.16
Gold Production	Ounces	538,450
Annual Gold Production (LOM average)	Oz./y	61,749
Gold Production (Gross Revenues)	US$ K	699,984
Net Revenues [(a)]	US$ K	650,312
Total Operating Cost	US$ K	382,179
Total Cash Costs (Operating + Refining Charges and Royalties)	US$ K	431,851
Total Capital Costs [(a)]	US$ K	123,007
Initial Capital Costs	US$ K	84,440
Sustaining Capital Costs [(b)]	US$ K	38,567
All-in Cost (Cash Costs + Capital Costs)	US$ K	554,858

Description	Units	LOM
Financial results – Pre-Tax		
Total Cash Flow	US$ K	145,126
NPV @ 5%	US$ K	102,540
Pre-Tax IRR	%	34
Pay-back Period	Years	2.8
Financial results – Post-Tax		
Total Cash Flow	US$ K	92,502
NPV @ 5%	US$ K	62,399
Post-Tax IRR	%	25
Pay-back Period	Years	3.4

Notes: [a] Including Direct Costs, Indirect Costs, and Contingencies
[b] Sustaining Capital includes Mine Closure Costs and Salvage Value.

The major highlights of the economic analysis are as follows.

Gold Production

The Life of Mine (LOM) gold production will be as follows:

- Gold: LOM average annual production of 61,749 troy ounces per annum;
- Gold: LOM production of 538,450 troy ounces.

Gold annual production for Years 1 and 2 averages 74,850 troy ounces per annum for a total of 149,700 troy ounces for that 2-year period. Note that the throughput is 2 Mt/a for year 1 and 3Mt/a for Year 2.

Total Operating Costs

LOM average operating costs of US$710 per troy ounce gold, inclusive of mining, processing, assay, and general &administration costs.

The average operating costs during Years 1 and 2, inclusive of mining, processing, assay, and general & administration costs, is US$449 per troy ounce gold.

Total Cash Costs

LOM cash costs of US$802 per troy ounce of gold, inclusive of operating cost, transport, royalties and refining charges.

The average cash costs during Years 1 and 2, inclusive of operating cost, transport, refining and royalty charges and royalties, is US$541 per troy ounce gold.

Total Capital Costs

LOM capital of US$228 per troy ounce of gold is inclusive of construction capital, sustaining capital and closure costs.

Other relevant average costs are provided in Table 22.5.

Table 22.5 Average Costs Summary (LOM averages), Owner Operated Scenario

Description	US$/T. feed	US$/oz
Total Operating Cost	15.45	710
Total Cash Cost (Operating + Refining Charges and Royalties)	17.46	802
Total Capital Cost	4.97	228
Initial Capital Costs	3.41	157
Sustaining Capital Costs [(a)]	1.56	72
All-in Cost (Cash Costs + Capital Costs)	22.44	1,030

Note: (a) Sustaining Capital includes Mine Closure Costs and credit for salvage of equipment, plate works, structural steel, and steel sheeting.

22.3.2 CONTRACT MINING SCENARIO

The technical parameters, production forecasts and estimates described elsewhere in this report are reflected in the LOM Project cash flow model in Table 22.6.

Figure 22.3 shows the pre-tax cash flows as well as the cumulative cash flow over the Project's life. Figure 22.4 shows the post-tax cash flows as well as the cumulative cash flow over the Project's life. The payback period corresponds to the time at which the cumulative cash flow becomes positive: during Year 2 for the pre-tax model and during Year 3 for the post-tax.

The cash flows occurring in Years 12 to 14 are expenses for environmental monitoring ($133,000/year) following final closure of the mine.

Figure 22.3 Pre-tax Cash Flows and Cumulative Cash Flow, Contract Mining Scenario

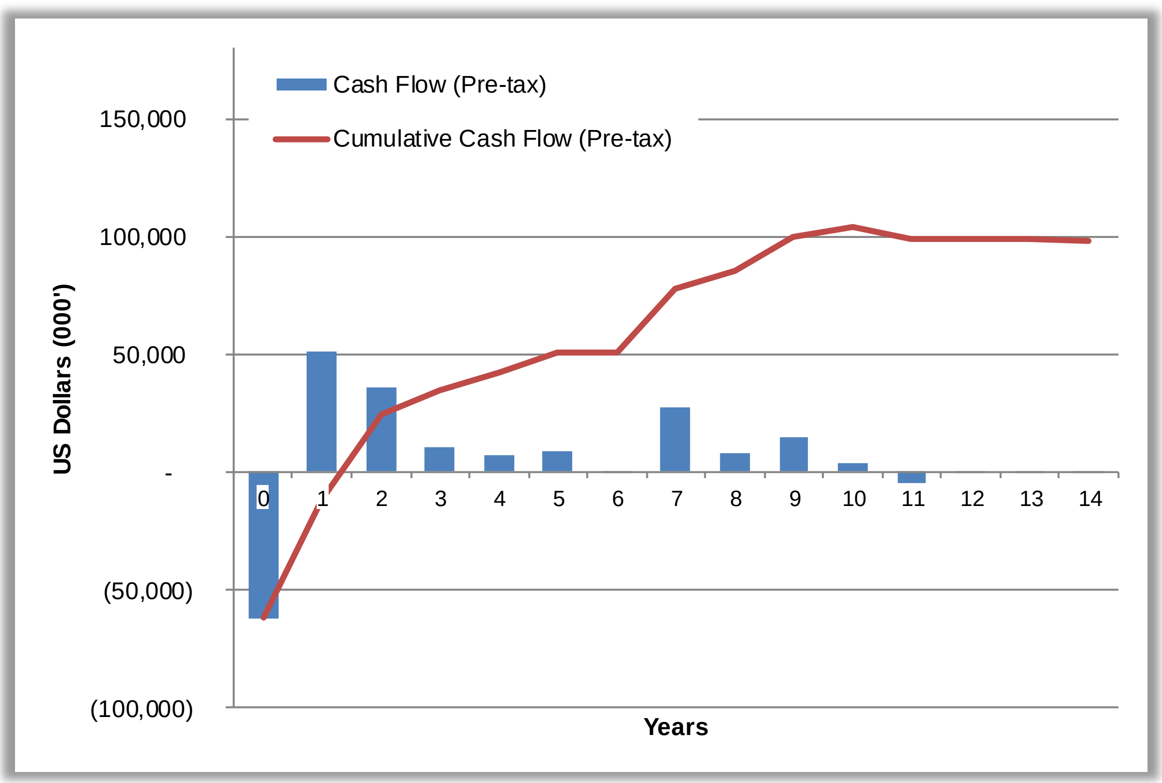


Figure 22.4 Post-tax Cash Flows and Cumulative Cash Flow, Contract Mining Scenario

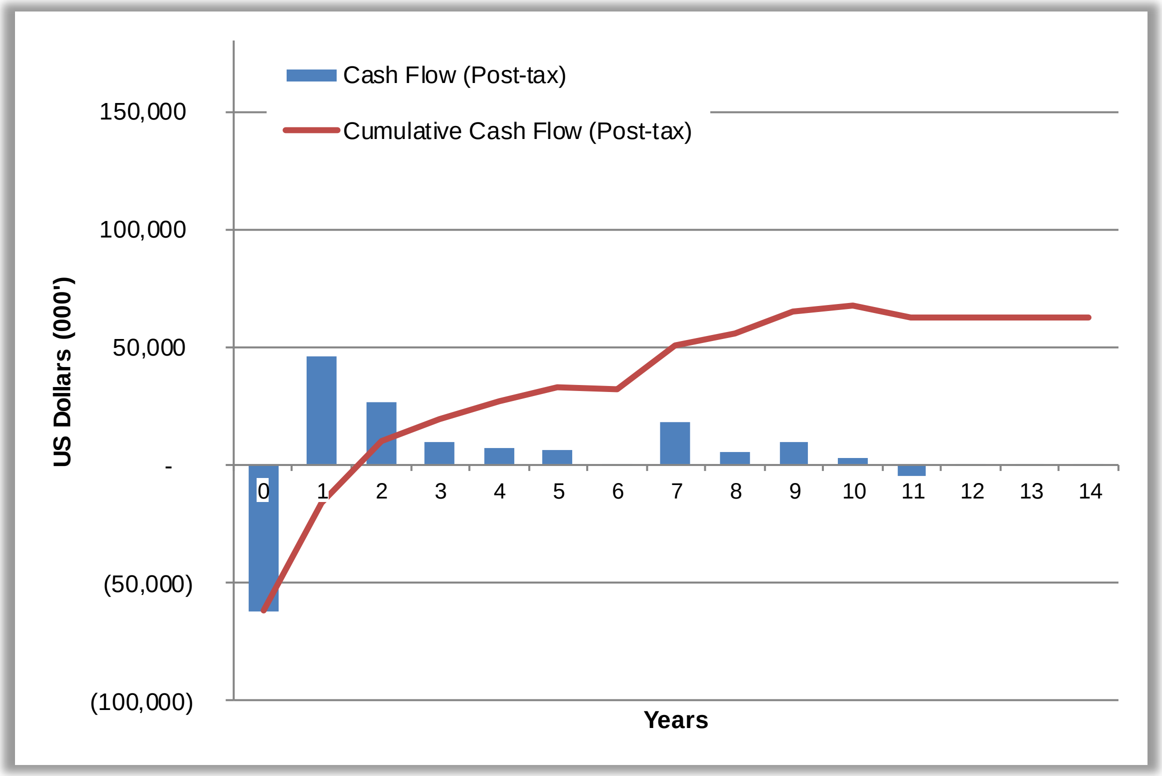


Table 22.6 Cash Flow Statement, Contract Mining Scenario

ITEM Description	unit	TOTAL	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Mining																		
Total Material Mined	T '000	102,751	-	6,317	12,749	12,225	12,496	12,777	13,486	12,653	12,369	7,678	-	-	-	-	-	-
Strip Ratio	w: HL	3.16	-	2.16	3.25	3.07	3.17	3.26	3.50	3.22	3.79	2.58	-	-	-	-	-	-
Waste Rock	T '000	78,021	-	4,317	9,749	9,225	9,496	9,777	10,486	9,653	9,785	5,533	-	-	-	-	-	-
Heap Leach Feed	T '000	24,729	-	2,000	3,000	3,000	3,000	3,000	3,000	3,000	2,584	2,145	-	-	-	-	-	-
Heap Leach Feed grade	g/T	0.91	-	1.52	1.05	0.74	0.71	0.75	0.70	1.05	0.88	0.97	-	-	-	-	-	-
Heap Leach Feed - Ounces	Oz.	720,858	-	97,987	101,741	71,570	68,948	71,959	67,091	101,036	73,429	67,098	-	-	-	-	-	-
Gold Production	**Oz.**	**538,450**	**-**	**73,490**	**76,210**	**53,677**	**51,711**	**53,949**	**50,230**	**74,460**	**54,777**	**49,945**	**-**	**-**	**-**	**-**	**-**	**-**
REVENUES																		
Gold Doré (gross revenues)	K US$	699,984	-	95,537	99,073	69,781	67,225	70,133	65,299	96,798	71,210	64,929	-	-	-	-	-	-
Refining charges, doré transport and insurances	K US$	673	-	92	95	67	65	67	63	93	68	62	-	-	-	-	-	-
Royalties	K US$	48,999	-	6,688	6,935	4,885	4,706	4,909	4,571	6,776	4,985	4,545	-	-	-	-	-	-
Net Revenues	K US$	**650,312**	**-**	**88,758**	**92,043**	**64,829**	**62,454**	**65,157**	**60,665**	**89,929**	**66,157**	**60,321**	**-**	**-**	**-**	**-**	**-**	**-**
OPERATING COSTS																		
Mining (Owner and Contractor)	K US$	317,480	693	22,346	37,540	35,794	36,744	37,839	41,054	40,347	37,603	27,519	-	-	-	-	-	-
Mining - By Owner	K US$	11,429	693	1,215	1,235	1,235	1,235	1,235	1,235	1,225	1,215	904	-	-	-	-	-	-
Mining - By Contractor	K US$	306,051	-	21,131	36,305	34,559	35,509	36,604	39,819	39,121	36,387	26,615	-	-	-	-	-	-
Processing	K US$	128,013	-	10,889	15,843	16,075	15,932	15,739	15,053	14,599	13,304	10,580	-	-	-	-	-	-
Environmental	K US$	554	-	62	62	62	62	62	62	62	62	56	-	-	-	-	-	-
Site Infrastructures	K US$	445	-	50	50	50	50	50	50	50	50	45	-	-	-	-	-	-
G&A (Owner and Contractor)	K US$	15,269	-	1,697	1,697	1,697	1,697	1,697	1,697	1,697	1,697	1,697	-	-	-	-	-	-
General and Administration - By Owner	K US$	15,269	-	1,697	1,697	1,697	1,697	1,697	1,697	1,697	1,697	1,697	-	-	-	-	-	-
General and Administration - By Contractor	K US$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mineral Tenure Fess and Rights	K US$	6,177	-	512	512	725	725	725	725	725	725	725	16	16	16	16	16	-
Total Operating Costs	K US$	467,937	693	35,556	55,705	54,402	55,210	56,111	58,641	57,479	53,440	40,622	16	16	16	16	16	-
Total Operating Costs	USD/oz.	869	9	467	1,038	1,052	1,023	1,117	788	1,049	1,070	-	-	-	-	-	-	-
Total Cash Cost (Operating + Refining and Royalties)	K US$	517,609	693	42,336	62,735	59,354	59,980	61,088	63,274	64,348	58,493	45,229	16	16	16	16	16	-
Total Cash Cost (Operating + Refining and Royalties)	USD/oz.	961	9	556	1,169	1,148	1,112	1,216	850	1,175	1,171	-	-	-	-	-	-	-
CAPITAL COSTS																		
Direct Costs																		
Mining (Owner and Contractor)	K US$	1,325	378	480	-	-	-	-	180	-	-	286	-	-	-	-	-	-
Mining - by Owner	K US$	660	-	480	-	-	-	-	180	-	-	-	-	-	-	-	-	-
Mining - by Contractor	K US$	665	378	-	-	-	-	-	-	-	-	286	-	-	-	-	-	-
Processing - by Owner	K US$	35,615	35,615	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Environmental	K US$	18,265	-	-	-	-	-	-	-	3,573	3,573	3,573	3,573	3,573	133	133	133	-
Infrastructure (Owner and Contractor)	K US$	7,135	4,717	1,090	-	-	-	-	1,328	-	-	-	-	-	-	-	-	-
Infrastructure by Owner	K US$	1,021	1,021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Site Establishment by Contractor, including:	K US$	6,114	3,696	1,090	-	-	-	-	1,328	-	-	-	-	-	-	-	-	-
Salvage values	K US$	(7,174)	-	-	-	-	-	-	-	-	-	-	(7,174)	-	-	-	-	-
Sub-Total - Direct Costs	K US$	55,166	40,710	1,570	-	-	-	-	1,508	3,573	3,573	3,859	(3,601)	3,573	133	133	133	-
Indirect Costs		-																
EPCM	K US$	6,596	4,630	-	-	-	-	151	357	357	386	357	357	-	-	-	-	-
Construction Indirect	K US$	8,094	4,972	662	122	68	76	170	197	357	357	357	357	357	13	13	13	-
Owner's Costs	K US$	3,100	3,100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sub-total - Indirect Costs	K US$	17,789	12,702	662	122	68	76	321	554	715	743	715	715	357	13	13	13	-
Total Capital Costs	**K US$**	**72,956**	**53,412**	**2,232**	**122**	**68**	**76**	**321**	**2,063**	**4,288**	**4,316**	**4,574**	**(2,886)**	**3,930**	**147**	**147**	**147**	**-**
Contingencies on direct costs		11,033	8,142	314	-	-	-	-	302	715	715	772	(720)	715	27	27	27	-
Total Capital Costs and Contingencies	**K US$**	**83,989**	**61,555**	**2,546**	**122**	**68**	**76**	**321**	**2,365**	**5,002**	**5,031**	**5,346**	**(3,607)**	**4,645**	**173**	**173**	**173**	**-**
TOTAL OPERATIONAL AND CAPITAL COSTS	**K US$**	**551,926**	**62,248**	**38,102**	**55,827**	**54,471**	**55,286**	**56,432**	**61,005**	**62,481**	**58,471**	**45,968**	**(3,591)**	**4,661**	**189**	**189**	**189**	**-**
PRE-TAX CASH FLOW	K US$	98,387	(62,248)	50,656	36,216	10,358	7,168	8,725	(340)	27,448	7,686	14,354	3,591	(4,661)	(189)	(189)	(189)	-
CUMULATIVE PRE-TAX CASH FLOW	K US$		(62,248)	(11,592)	24,624	34,983	42,151	50,875	50,536	77,983	85,669	100,023	103,614	98,954	98,765	98,576	98,387	98,387
DISCOUNTED PRE-TAX CASH FLOW @ i = 5%	K US$	73,413	(62,248)	48,243	32,849	8,948	5,897	6,836	(254)	19,507	5,202	9,253	2,205	(2,725)	(105)	(100)	(95)	-
PRE-TAX INTERNAL RATE OF RETURN	**%**	**44%**																
PRE-TAX NET PRESENT VALUE (NPV) @ i = 5%	**K US$**	**73,413**																
TAXES, DEDUCTIONS AND AMORTIZATIONS																		
Corporate Income Taxes (CIT)	K US$	36,265	-	4,932	9,716	666	-	2,493	303	9,501	2,585	4,998	1,071	-	-	-	-	-
POST-TAX CASH FLOW	K US$	62,122	(62,248)	45,724	26,500	9,692	7,168	6,232	(643)	17,947	5,101	9,355	2,520	(4,661)	(189)	(189)	(189)	-
CUMULATIVE POST-TAX CASH FLOW			(62,248)	(16,523)	9,977	19,669	26,837	33,069	32,426	50,372	55,474	64,829	67,349	62,689	62,500	62,311	62,122	62,122
DISCOUNTED POST-TAX CASH FLOW @ i = 5%	K US$	44,767	(62,248)	43,547	24,036	8,373	5,897	4,883	(480)	12,754	3,453	6,031	1,547	(2,725)	(105)	(100)	(95)	-
POST-TAX INTERNAL RATE OF RETURN	**%**	**31%**																
POST-TAX NET PRESENT VALUE (NPV) @ i = 5%	**K US$**	**44,767**																

The financial results of the Project are summarized in Table 22.7. On a pre-tax basis, the Project has a Net Present Value (NPV) of US$ 102M at a discount rate of 5 %, an Internal Rate of Return (IRR) of 34%, and a payback period of 2.8 years. On a post-tax basis, the NPV is US$62 M at a discount rate of 5 %, the IRR is-25%, and the payback period is 3.4 years.

Table 22.7 Summary of Financial Results, Contract Mining Scenario

Description	Units	LOM
Tonnage Feed	T' 000	24,729
Feed Grade Processed	g/T	0.91
Gold Recovery (average)	%	74.7%
Production Period	Years	8.72
Tonnage Waste Rock	T' 000	78,021
Stripping Ratio	W/O	3.16
Gold Production	Ounces	538,450
Annual Gold Production (LOM average)	Oz./y	61,749
Gold Production (Gross Revenues)	US$ K	699,984
Net Revenues [a]	US$ K	650,312
Total Operating Cost	US$ K	467,937
Total Cash Costs (Operating + Refining Charges and Royalties)	US$ K	517,609
Total Capital Costs [a]	US$ K	83,989
Initial Capital Costs	US$ K	61,555
Sustaining Capital Costs [b]	US$ K	22,435
All-in Cost (Cash Costs + Capital Costs)	US$ K	601,598
Financial results – Pre-tax		
Total Cash Flow	US$ K	98,387
NPV @ 5%	US$ K	73,413
Pre-Tax IRR	%	44
Pay-back Period	Years	2.3
Financial results – Post-tax		
Total Cash Flow	US$ K	62,122
NPV @ 5%	US$ K	44,767
Post-Tax IRR	%	31
Pay-back Period	Years	2.6

Notes: [a] Including Direct Costs, Indirect Costs, and Contingencies
[b] Sustaining Capital includes Mine Closure Costs and Salvage Value.

Table 22.8 summarizes other relevant average costs.

Table 22.8 Average Costs Summary (LOM averages), Contract Mining Scenario

Description	US$/T. feed	US$/oz
Total Operating Cost	18.92	869
Total Cash Cost (Operating + Refining Charges and Royalties)	20.93	961
Total Capital Cost	3.40	156
Initial Capital Costs	2.49	114
Sustaining Capital Costs [(a)]	0.91	42
All-in Cost (Cash Costs + Capital Costs)	24.33	1,117

Note: (a) Sustaining Capital includes Mine Closure Costs and credit for salvage of equipment, plate works, structural steel, and steel sheeting.

22.4 SENSITIVITY ANALYSIS

22.4.1 OWNER OPERATED SCENARIO

A sensitivity analysis was performed on the pre-tax profits by varying the major key variables to a range of percentage of the base case cash flow and each sensitivity analysis was performed independent of the other.

The key variables selected are as follows.

- Gold price +/-20% (increments of +/- 10%).
- Capital costs (excluding Owner's costs) +/-30% (increments of +/- 15%):
  - The variation is applied on "Direct Cost"; since EPCM, Construction Indirect and Contingencies are percentage of Direct costs, they too will be affected accordingly;
  - Owner's costs are short term budget for project development: they are not subjected to sensitivity variation.
- Operating costs (excluding mineral tenure fees) +/-30% (increments of +/- 15%):
  - Mineral tenure fees are fixed by Ghana regulations and are exclude from the sensitivity.
- Gold recovery +/- 20% (increments of +/- 10%): The variations on recovery affect rates for each type of material: oxides, transition and fresh.
- Head Grade +/- 20% (increments of +/- 10%): The head grade variation does not affect the mineral resources estimate production schedule. The same quantity of material is feed to the heap leach but at a different grade.

Cash flows were discounted using the base case rate of 5% but also a 0% rate to reflect the total cash flow. The cash flow was also discounted using a rate of 10% as a measure of sensitivity of that economic parameter as well.

The results of the sensitivities on the pre-tax model are summarized in Tables 22.9 to 22.13. In each table, the base case is shown using bold font.

Table 22.9 Sensitivity on Gold Price (pre-tax)

Description	Unit	Net Present Value (US$ 000's)				
%Variation	%	-20%	-10%	**0%**	10%	20%
Gold Price	US$/oz.	1,040	1,170	**1,300**	1,430	1,560
Discount Rate (%)	0%	14,929	80,028	**145,126**	210,225	275,323
	5%	(2,084)	49,899	**101,882**	153,865	205,848
	10%	(14,153)	28,432	**71,018**	113,603	156,189
IRR	%	5%	20%	**34%**	47%	59%
Payback Period	years	9.43	3.81	**2.84**	2.54	2.33

Table 22.10 Sensitivity on Total Capital Costs and Contingencies (pre-tax)

Description	Unit	Net Present Value (US$ 000's)				
% Variation	%	30%	15%	**0%**	-15%	-30%
Total Capital Costs with Contingencies	US$ 000's	158,979	140,993	**123,007**	105,021	87,035
Discount Rate (%)	0%	109,154	127,140	**145,126**	163,112	181,098
	5%	67,537	84,709	**101,882**	119,054	136,226
	10%	37,920	54,469	**71,018**	87,567	104,116
IRR	%	20%	26%	**34%**	45%	61%
Payback period	years	4.27	3.39	**2.84**	2.52	2.21

Table 22.11 Sensitivity on Operating Costs (pre-tax)

Description	Unit	Net Present Value (US$ 000's)				
% Variation	%	30%	15%	**0%**	-15%	-30%
Total Operating Costs	US$ 000's	494,980	438,579	**382,179**	325,779	269,378
Discount Rate (%)	0%	32,325	88,726	**145,126**	201,527	257,927
	5%	13,373	57,627	**101,882**	146,136	190,390
	10%	(124)	35,447	**71,018**	106,589	142,160
IRR	%	10%	23%	**34%**	43%	52%
Payback period	years	7.62	3.20	**2.84**	2.66	2.53

Table 22.12 Sensitivity on Recovery (pre-tax)

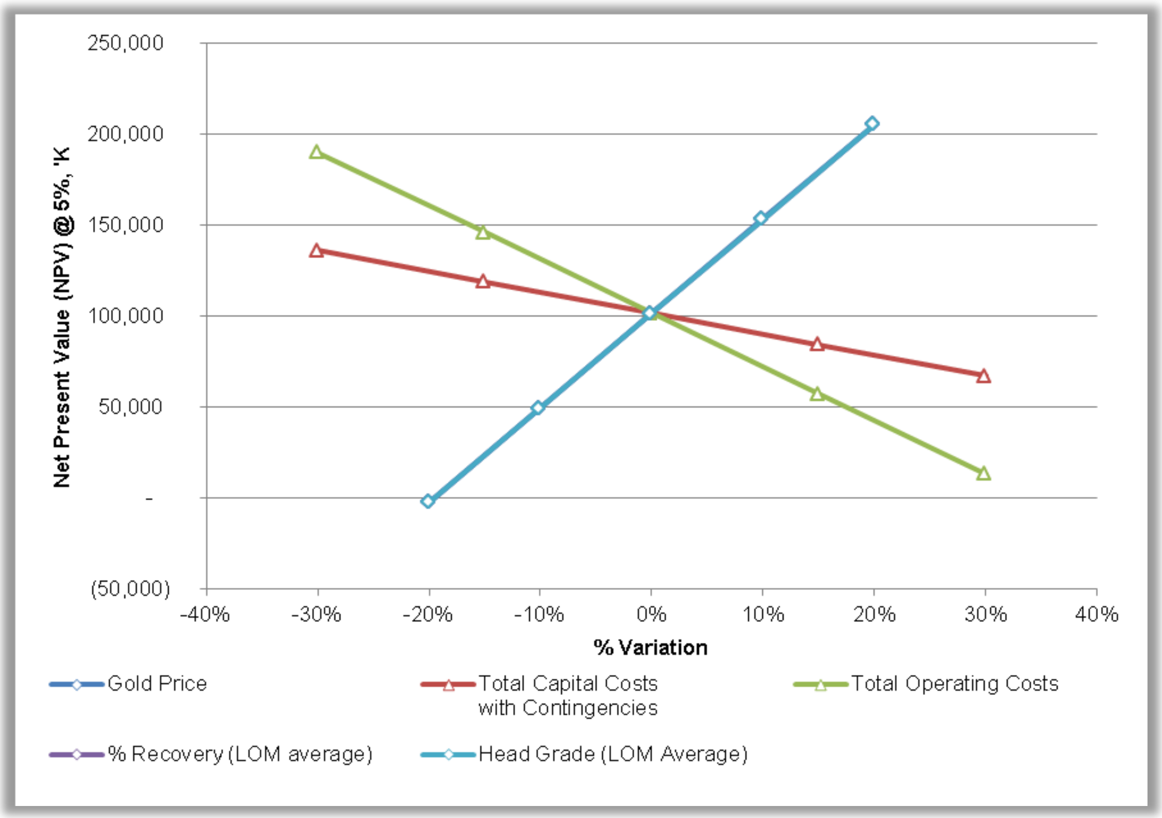
Description	Unit	Net Present Value (US$ 000's)				
% Variation	%	-20%	-10%	**0%**	10%	20%
Recovery (LOM Average, Oxides / Transition / Fresh)	%	60 / 60 / 58.4	67.5 / 67.5 / 65.7	**75 / 75 / 73**	82.5 / 82.5 / 80.3	90 / 90 / 87.6
Gold Production	Troy oz.	430,760	484,605	**538,450**	592,294	646,139
Discount Rate (%)	0%	15,064	80,095	**145,126**	210,157	275,189
	5%	(1,977)	49,952	**101,882**	153,811	205,740
	10%	(14,065)	28,476	**71,018**	113,559	156,101
IRR	%	5%	20%	**34%**	47%	59%
Payback period	years	9.42	3.81	**2.84**	2.54	2.33

Table 22.13 Sensitivity on Head Grade (pre-tax)

Description	Unit	Net Present Value (US$ 000's)				
% Variation	%	-20%	-10%	**0%**	10%	20%
Head Grade (LOM Average)	gr Au/T	0.73	0.82	**0.91**	1.00	1.09
Gold Production (LOM Total)	Troy Oz.	430,760	484,605	**538,450**	592,294	646,139
Discount Rate (%)	0%	15,064	80,095	**145,126**	210,157	275,189
	5%	(1,977)	49,952	**101,882**	153,811	205,740
	10%	(14,065)	28,476	**71,018**	113,559	156,101
IRR	%	5%	20%	**34%**	47%	59%
Payback period	years	9.42	3.81	**2.84**	2.54	2.33

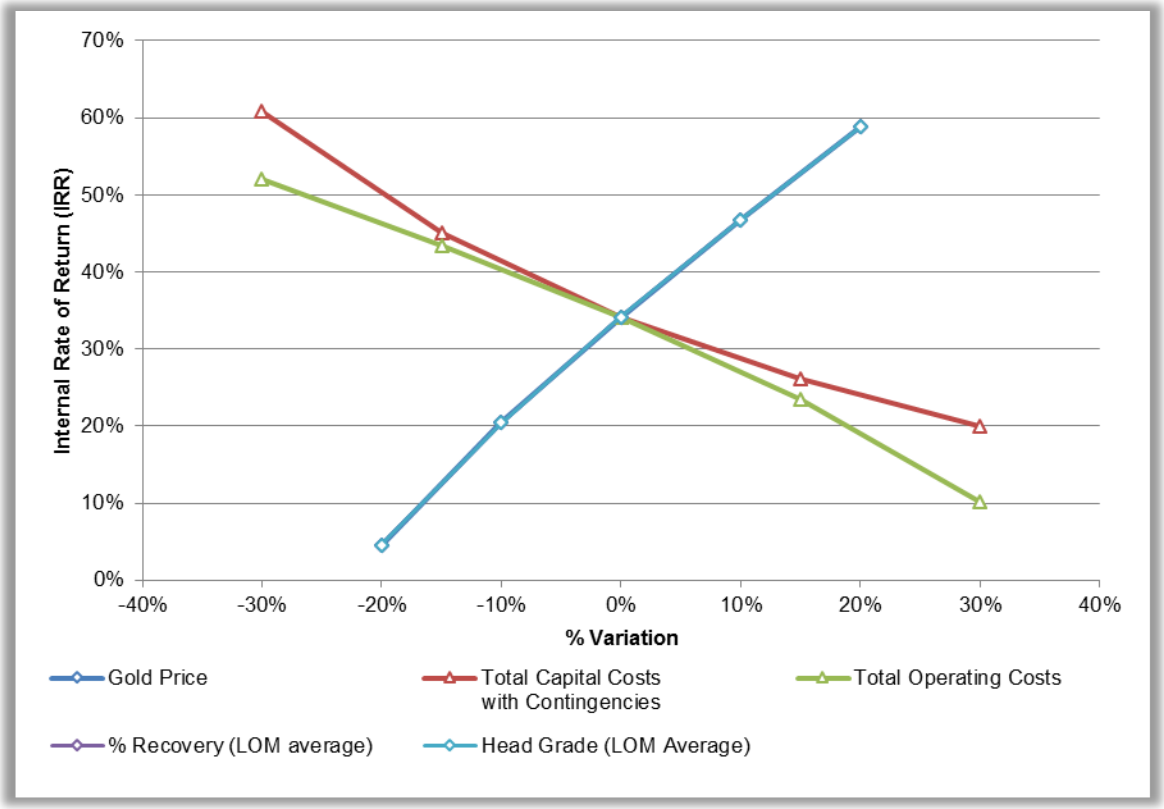
Figures 22.5 and 22.6 show the detailed sensitivity analysis of changing the key variables to the above mentioned percentage of variation.

Figure 22.5 NPV Sensitivity at 5% Discount Rate (pre-tax), Owner Operated Scenario



Note: The sensitivity lines for "Gold Price", "% Recovery (LOM)" and "Head Grade (LOM)" are overlapping in the graph.

Figure 22.6 IRR Sensitivity (pre-tax), Owner Operated Scenario



Note: The sensitivity lines for “Gold Price”, “% Recovery (LOM)” and “Head Grade (LOM)” are overlapping in the graph.

22.4.2 CONTRACT MINING SCENARIO

Similar to the Owner Operated scenario, a sensitivity analysis was performed on the pre-tax profits by varying the major key variables to a range of percentage of the base case cash flow and each sensitivity analysis was performed independent of the other. Cash flows were discounted using the base case rate of 5% but also a 0% rate to reflect the total cash flow. The cash flow was also discounted using a rate of 10% as a measure of sensitivity of that economic parameter as well.

The results of the sensitivities on the pre-tax model are summarized in Tables 22.14 to 22.18. In each table, the base case is shown using bold font.

Table 22.14 Sensitivity on Gold Price (pre-tax)

Description	Unit	Net Present Value (US$ 000's)				
%Variation	%	-20%	-10%	**0%**	10%	20%
Gold Price	US$/oz.	1,040	1,170	**1,300**	1,430	1,560
Discount Rate (%)	0%	(31,811)	33,288	**98,387**	163,485	228,584
	5%	(30,553)	21,430	**73,413**	125,396	177,379
	10%	(30,189)	12,396	**54,982**	97,567	140,153
IRR	%	N/A	20%	**44%**	64%	82%
Payback Period	years	N/A	2.76	**2.32**	2.06	1.91

Table 22.15 Sensitivity on Total Capital Costs and Contingencies (pre-tax)

Description	Unit	Net Present Value (US$ 000's)				
% Variation	%	30%	15%	**0%**	-15%	-30%
Total Capital Costs with Contingencies	US$ 000's	107,204	95,597	**83,989**	76,633	60,774
Discount Rate (%)	0%	75,171	86,779	**98,387**	105,742	121,602
	5%	52,139	62,776	**73,413**	81,674	94,687
	10%	34,952	44,967	**54,982**	63,633	75,012
IRR	%	27%	35%	**44%**	57%	74%
Payback period	years	2.80	2.56	**2.32**	2.08	1.89

Table 22.16 Sensitivity on Operating Costs (pre-tax)

Description	Unit	Net Present Value (US$ 000's)				
% Variation	%	30%	15%	**0%**	-15%	-30%
Total Operating Costs	US$ 000's	606,465	537,201	**467,937**	398,673	329,409
Discount Rate (%)	0%	(40,235)	29,076	**98,387**	167,697	237,008
	5%	(35,783)	18,815	**73,413**	128,011	182,609
	10%	(33,142)	10,920	**54,982**	99,044	143,106
IRR	%	N/A	20%	**44%**	62%	77%
Payback period	years	N/A	2.61	**2.32**	2.14	2.01

Table 22.17 Sensitivity on Recovery (pre-tax)

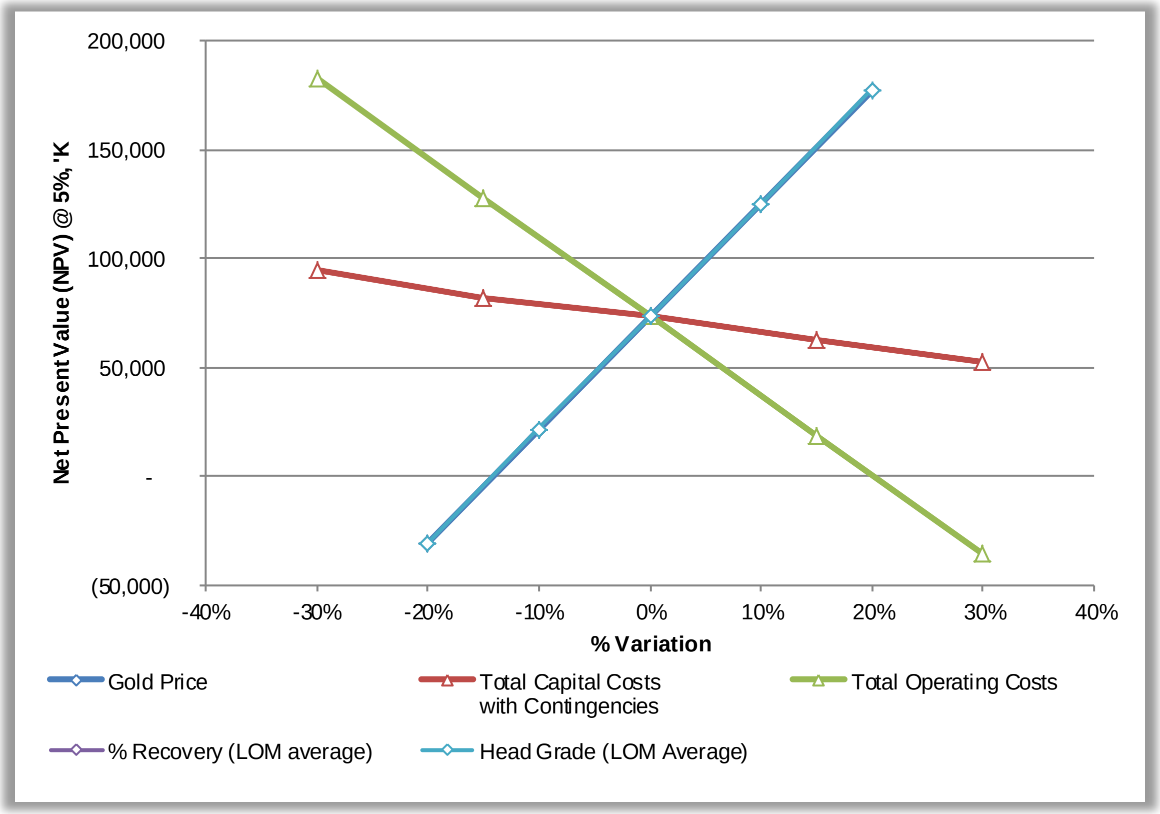
Description	Unit	Net Present Value (US$ 000's)				
% Variation	%	-20%	-10%	**0%**	10%	20%
Recovery (LOM Average, Oxides / Transition / Fresh)	%	60 / 60 / 58.4	67.5 / 67.5 / 65.7	**75 / 75 / 73**	82.5 / 82.5 / 80.3	90 / 90 / 87.6
Gold Production	Troy Oz.	430,760	484,605	**538,450**	592,294	646,139
Discount Rate (%)	0%	(31,676)	33,355	**98,387**	163,418	228,449
	5%	(30,446)	21,484	**73,413**	125,342	177,271
	10%	(30,101)	12,440	**54,982**	97,523	140,065
IRR	%	N/A	20%	**44%**	64%	82%
Payback period	years	N/A	2.76	**2.32**	2.06	1.91

Table 22.18 Sensitivity on Head Grade (pre-tax)

Description	Unit	Net Present Value (US$ 000's)				
% Variation	%	-20%	-10%	**0%**	10%	20%
Head Grade (LOM Average)	gr Au/T	0.73	0.82	**0.91**	1.00	1.09
Gold Production (LOM Total)	Troy Oz.	430,760	484,605	**538,450**	592,294	646,139
Discount Rate (%)	0%	(31,676)	33,355	98,387	163,418	228,449
	5%	(30,446)	21,484	73,413	125,342	177,271
	10%	(30,101)	12,440	54,982	97,523	140,065
IRR	%	N/A	20%	44%	64%	82%
Payback period	years	N/A	2.76	2.32	2.06	1.91

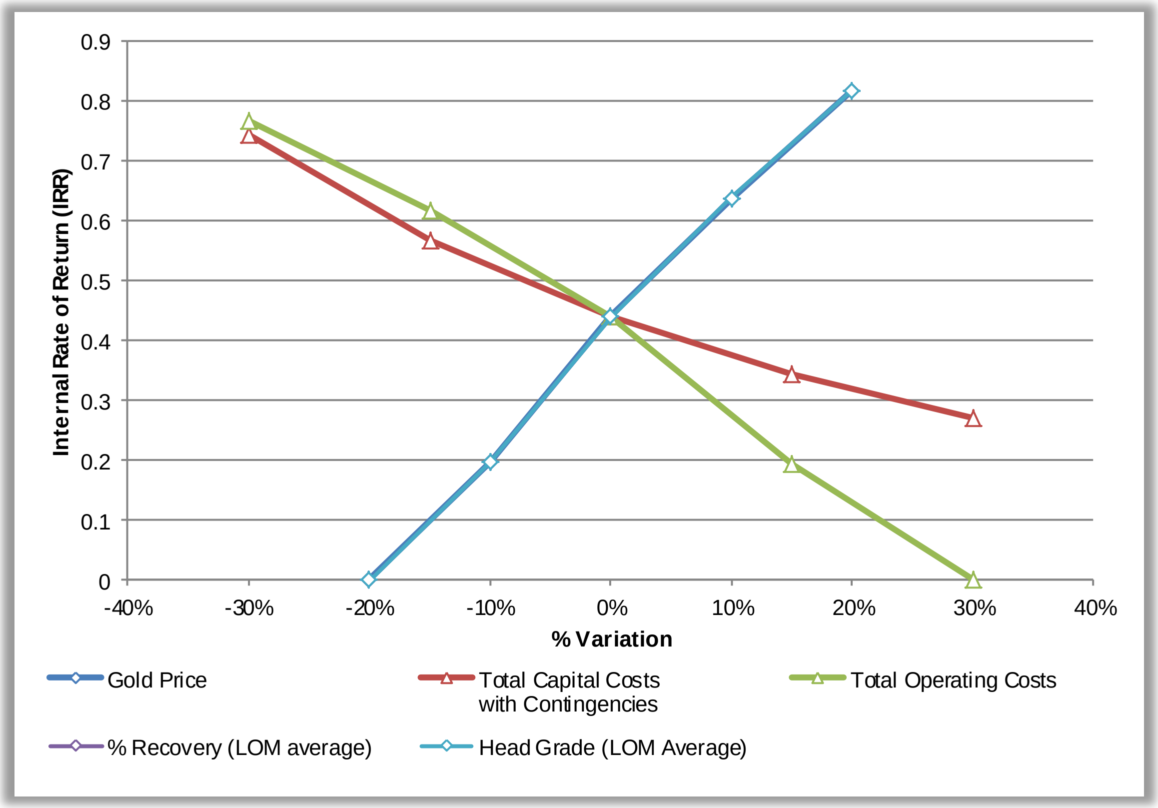
Figures 22.7 and 22.8 show the detailed sensitivity analysis of changing the key variables to the above mentioned percentage of variation.

Figure 22.7 NPV Sensitivity at 5% Discount Rate (pre-tax), Contract Mining Scenario



Note: The sensitivity lines for “Gold Price”, “% Recovery (LOM)” and “Head Grade (LOM)” are overlapping in the graph.

Figure 22.8 IRR Sensitivity (pre-tax), Contract Mining Scenario



Note: The sensitivity lines for "Gold Price", "% Recovery (LOM)" and "Head Grade (LOM)" are overlapping in the graph.

22.5 DISCUSSION

When ranked, the sensitivity analysis indicates that the Project is most sensitive to gold price and gold recovery. From a cost perspective the Project is more sensitive to operating expenditure than capital costs.

Figures 22.5, 22.6, 22.7, and 22.8 show the detailed sensitivity analysis of changing the key variables to the above-mentioned percentage of variation. The head grade and recovery curves in Figures 22.5, 22.6, 22.7, and 22.8 overlap as they have equal effect on NPV and IRR. Those two curves also overlap the gold price curve as they have similar effect on the NPV and IRR.

22.6 FINANCIAL RESULTS COMPARISONS: OWNER OPERATED VS. CONTRACT MINING

Table 22.19 presents a comparison between the financial results of the Owner Operated scenario to the Contract Mining scenario. Figure 22.9 illustrates the various scenario cash flow results.

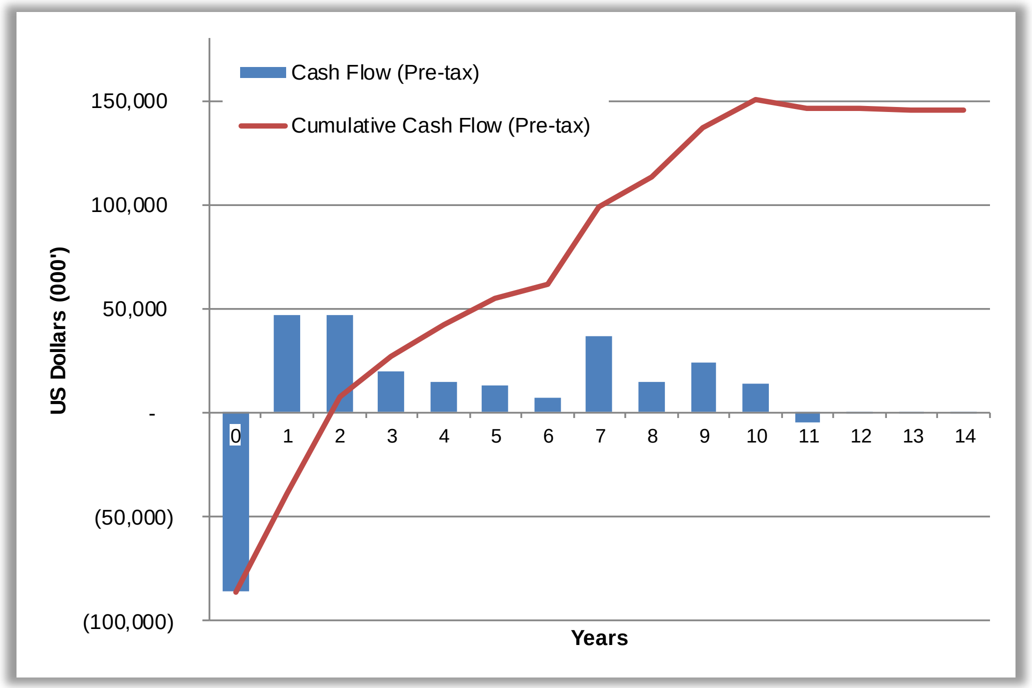
Table 22.19 Economic Evaluation Comparison

Description	Units	Owner Operated	Contract Mining
Financial results – Pre-tax			
Total Cash Flow	US$ K	145,126	98,387
NPV @ 5%	US$ K	102,540	73,413
Pre-Tax IRR	%	34	44
Pay-back Period (from start of construction)	Years	2.8	2.3
Financial results - Post-tax			
Total Cash Flow	US$ K	92,502	62,122
NPV @ 5%	US$ K	62,399	44,767
Post-Tax IRR	%	25	31
Pay-back Period (from start of construction)	Years	3.4	2.6

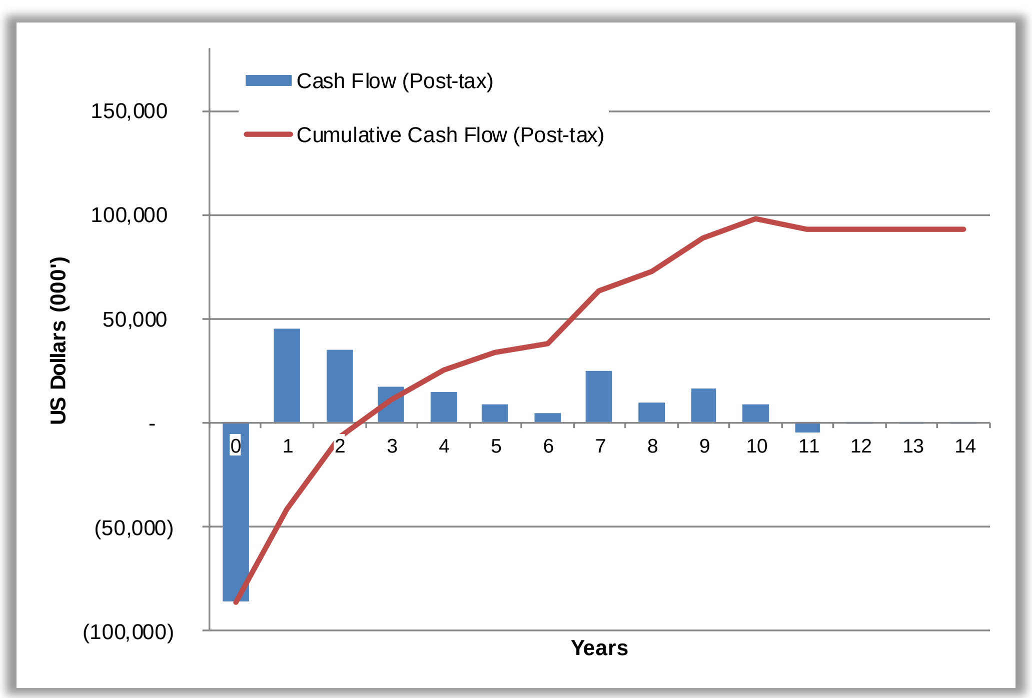
Figure 22.9 Scenario Comparisons on Cash Flows and Cumulative Cash Flow

OWNER OPERATED

Pre-tax Cash Flows and Cumulative Cash Flow (After Figure 22.1)

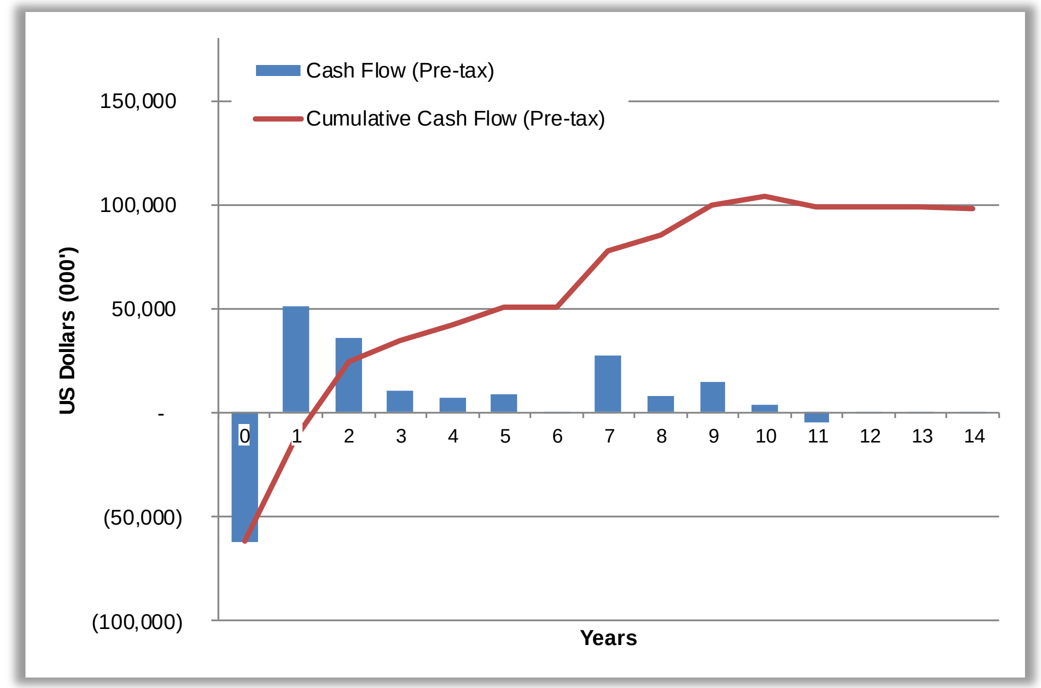


Post-tax Cash Flows and Cumulative Cash Flow (After Figure 22.2)

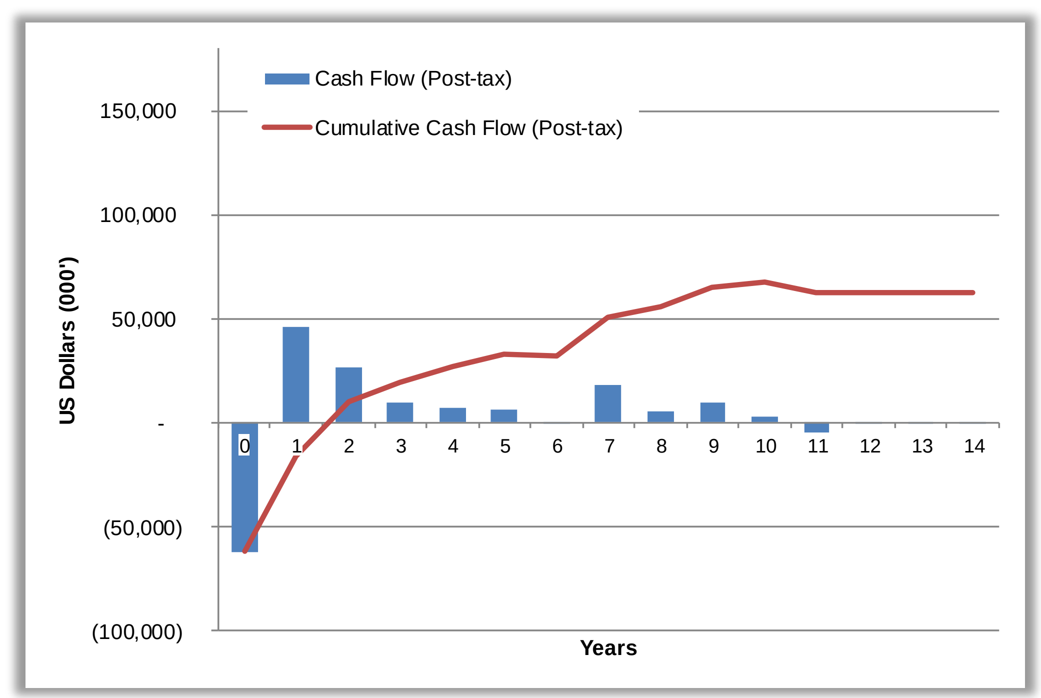


CONTRACT MINING

Pre-tax Cash Flows and Cumulative Cash Flow (After Figure 22.3)



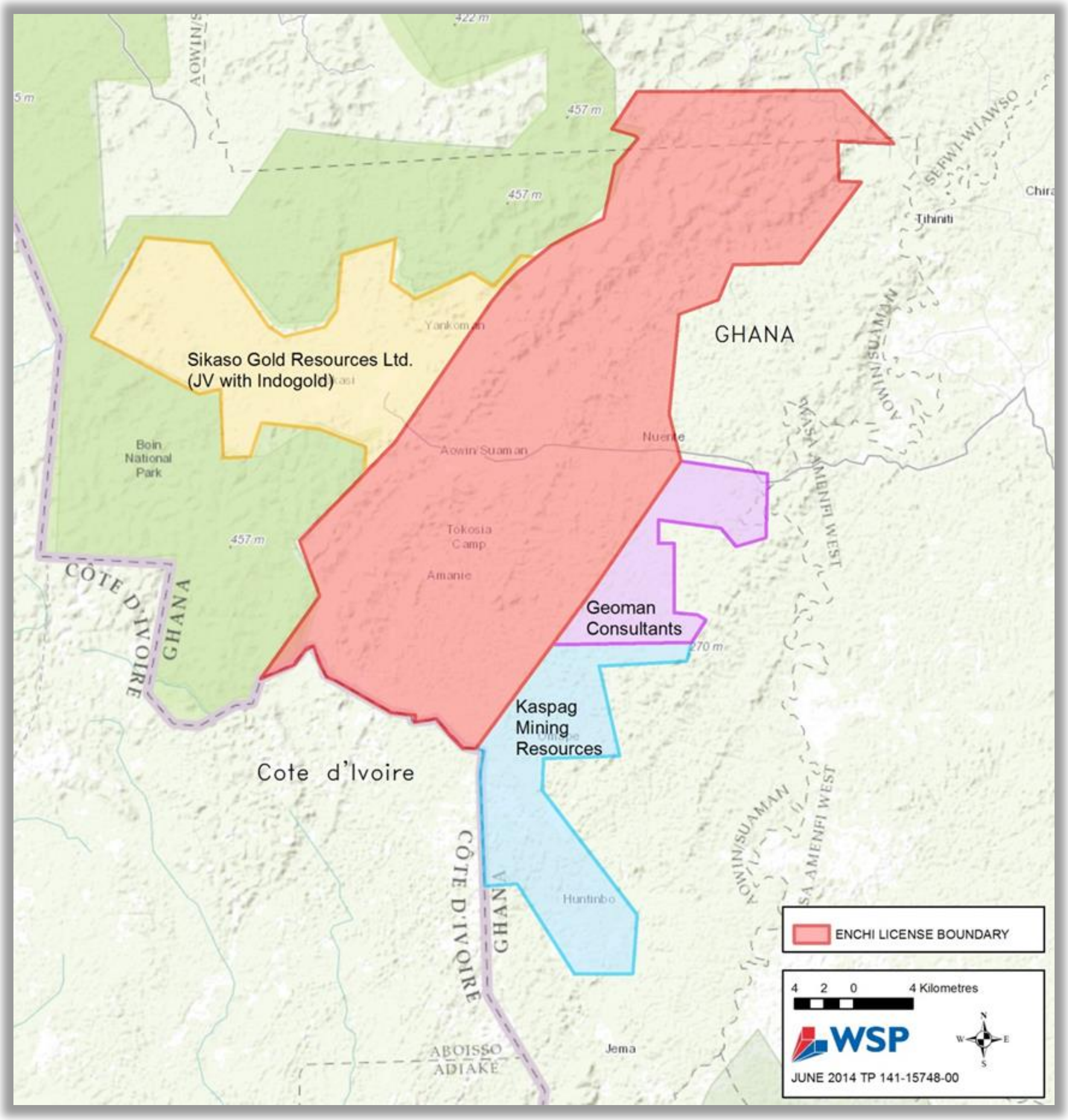
Post-tax Cash Flows and Cumulative Cash Flow (After Figure 22.4)



23 ADJACENT PROPERTIES

A few exploration licenses are active immediately adjacent to the Project (Figure 23.1).

Figure 23.1 Adjacent Properties



Indo Gold Ltd. (Indo Gold) signed an option to purchase agreement with Sikaso Gold Resources Ltd. on February 25, 2011 for a period of 42 months. No further activity regarding this transaction has been documented on the public records. Previous exploration on this property was limited to stream sediment sampling by Etruscan Resources Inc. Since the option agreement, Indo Gold has completed a regional stream sediment sampling program focusing on active streams as well as a ridge and spur soil sampling program in selected areas (www.indogold.com.au).

Geoman Consult Ltd. (Geoman) is a Ghanaian consulting group which conducts work in geological management within the mineral exploration sector, specifically within Africa and in Ghana in particular. Geoman was working with the Minerals Commission of Ghana to prove viability within the area for small scale miners. There is no record indicating if this work has been completed.

No public information could be located on any activities for Kasapag Mining Resources. It is unknown if these licenses are currently active.

Pinecrest's Enchi Gold Project is located 70 km south of Kinross' Chirano Gold Mine property. The Chirano mine area lies within the Proterozoic terrain of southwest Ghana, along a major structure separating the Sefwi Belt to the west from the Kumasi Basin to the east known as the Bibiani Shear Zone. The Enchi Gold Project covers a 40 km segment of the Bibiani Shear Zone where known gold mineralization is associated with major structures and subsidiary splays. The Chirano Gold Mine was commissioned in September 2005, and in 2014 produced 286,542 oz of gold equivalent (www.kinross.com). Gold mineralization at Chirano is hosted within fractured and intensely hydrothermally altered granite where gold is associated with 1 to 5% pyrite and the distribution of gold appears to be closely associated with the presence of pyrite (Red Back AIF March 30, 2010).

The Chirano Mine has14 known gold deposits over a 9 km strike length range in individual length from 150 to 700 m, and range in thickness from a few metres to over 70 m (Red Back NI 43-101 Chirano Gold Mine Technical Report May 2009). Individual deposits may extend to over 700 m in depth. Mining at Chirano is done by both open pit and underground extraction. As of December 21, 2014 Proven and Probable reserves were 12.1 Mt grading 2.38g/t gold for 0.92 Moz. The Measured and Indicated Resources totaled 15.4 Mt grading 2.46 g/t gold for 1.2 Moz, and the Inferred Resource totaled 1.2 Mt grading 3.43 g/t gold for 0.1 Moz (www.kinross.com).

WSP has not verified the technical data on the Chirano Mine and the gold mineralization at Chirano is not necessarily indicative of the mineralization on the Project.

24 OTHER RELEVANT DATA AND INFORMATION

There is no additional information or explanation required in order to make this report understandable and not misleading.

25 INTERPRETATIONS AND CONCLUSIONS

The economic analysis contained in this report is based entirely on Inferred Resources, and is preliminary in nature. Inferred Resources are considered too speculative geologically to have mining and economic considerations applied to them to be categorized as Mineral Reserves. There is no certainty that the economic results of this PEA will be realized.

25.1 TITLE AND GEOLOGY

Based on the review of the available information and observations made during the site visit, WSP concludes the following, in no particular order of perceived importance.

- The Property is currently held 100% by Pinecrest and subject to the right of the Government of Ghana to obtain a 10% carried interest.
- The approval process to grant licenses in the country is very slow. Although work can start on a license once an application is submitted, this does not guarantee the license will be granted.
- The Property is analogous to shear-hosted gold mineralization in quartz veining or quartz flooding. This style of mineralization is present in other mineral resources in the region.
- The Property is associated with mineralization related to the Bibiani Shear Zone that is known to host significantly large lode-gold deposits.
- The mineralization on the Property is associated to secondary and tertiary order shears splays off the Bibiani Shear Zone.
- Pinecrest has a strong understanding of the regional and local geology to support the interpretation of the mineralized zones on the Property.
- Mineralization is currently defined in fourteen individual zones at various stages of exploration. Three of the zones have drill defined mineral resources.
- Drilling and sampling procedures, sample preparation, and assay protocols are conducted in agreement with industry best practices.
- Verification of the drillhole collars, surveys, assays and drillhole logs indicates the Edgewater data is reliable to support the resource estimation.
- Discrepancy in the collar elevations relative to the topography at Nyamebekyere and Sewum continue to be an issue. Until this issue is resolved, the resources are likely to remain in the Inferred category.
- Based on the QA/QC program, the data is sufficiently reliable to support the resource estimate generated for the three zones on the Property.
- The mineral model has been constructed in conformance to industry standard practices.
- The geological understanding is sufficient to support the resource estimation.
- The presence of an oxide domain, a transition domain, and a fresh domain has been identified in the drill logs.

- → The current resource does not differentiate between the various weathering domains.
- → At a gold cut-off grade of 0.5 g/t, the Inferred Resource totals 37.4 Mt with an average grade of 0.90 g/t gold, based on the parameters for a small tonnage open pit heap leach operation.
- → The current resource is not pit constrained. The resource does not extend beyond 200 vertical metres, which is well within open pit depth parameters.
- → The Property contains resources that are comparable to other projects in the region.
- → The SG value used to determine that tonnage was derived from data used by operating mines in the region, which may reflect a lack of precision with respect to the resource tonnages.
- → The resources at Boin, Sewum, and Nyamebekyere remain open along strike and in the down-dip directions.
- → The remaining eleven mineral zones on the Property do not have enough data to support resource estimations. Additional exploration on these zones will not guarantee that the zones will support potentially economic material.

25.2 MINING

The Project's LOM production schedule is based on Inferred Resources. There are no Mineral Reserves identified for the Project at this time.

The pit optimization, mine design, and mine plan were based on 1,300 US$/oz gold price. The pit limit analysis yielded economic cut-off grades of 0.37 g/t for Fresh Material and 0.36 g/t for Oxide and Transitional Material. This provides a LOM plan of approximately 24.7 M tonnes of heap leach feed at an overall Au grade of 0.91 g/t. Table 25.1 summarizes the pit constrained resource for each of the deposits by material type.

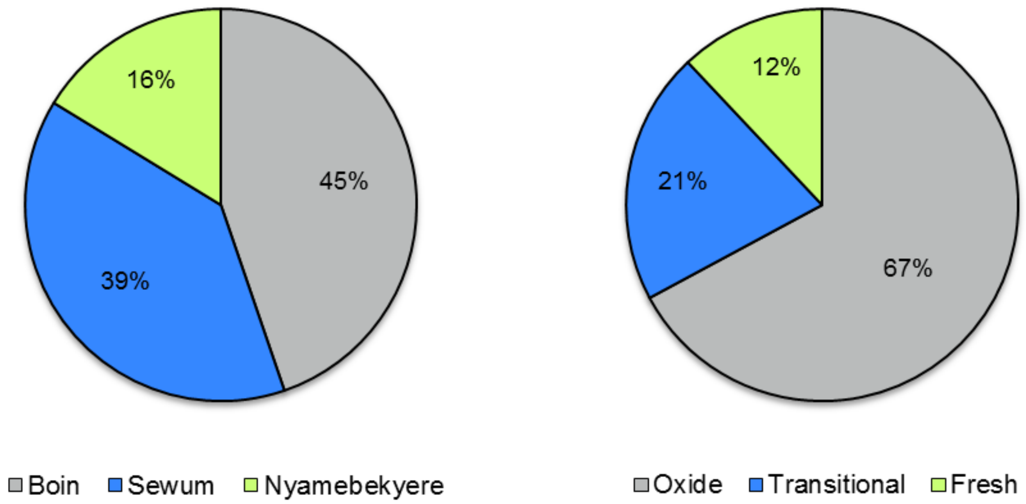
Table 25.1 Enchi Life of Mine Schedule – by Deposit Area

	Units	Total	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Sewum Pit												
Oxide Material	k tonnes	**9,284**	2,000	1,590	1,754	1,669	1,398	766	108	0	0	0
Transitional Material	k tonnes	**307**	0	49	0	204	54	1	0	0	0	0
Fresh Material	k tonnes	**48**	0	0	0	0	48	0	0	0	0	0
Total Heap Leach Feed	k tonnes	**9,640**	**2,000**	**1,638**	**1,754**	**1,873**	**1,500**	**767**	**108**	**0**	**0**	**0**
	g/t	0.86	1.52	0.92	0.70	0.63	0.56	0.53	0.52	0.00	0.00	0.00
Total Waste	k tonnes	**12,859**	**4,317**	**5,202**	**1,130**	**1,299**	**647**	**232**	**33**	**0**	**0**	**0**
Total Material	k tonnes	**22,499**	**6,317**	**6,840**	**2,884**	**3,171**	**2,147**	**999**	**141**	**0**	**0**	**0**
Boin Pit												
Oxide Material	k tonnes	**5,516**	0	1,016	1,238	1,085	1,033	520	419	18	186	0
Transitional Material	k tonnes	**3,144**	0	229	8	42	467	1,538	716	144	0	0
Fresh Material	k tonnes	**2,405**	0	117	0	0	0	175	1,756	357	0	0
Total Heap Leach Feed	k tonnes	**11,065**	**0**	**1,362**	**1,246**	**1,127**	**1,500**	**2,233**	**2,892**	**519**	**186**	**0**
	g/t	0.95	0.00	1.21	0.80	0.85	0.94	0.75	1.07	1.13	0.68	0.00
Total Waste	k tonnes	**47,317**	**0**	**4,547**	**8,095**	**8,198**	**9,130**	**10,254**	**5,966**	**539**	**589**	**0**
Total Material	k tonnes	**58,382**	**0**	**5,909**	**9,341**	**9,325**	**10,630**	**12,487**	**8,859**	**1,057**	**775**	**0**
Nyamebekyere Pit												
Oxide Material	k tonnes	**1,805**	0	0	0	0	0	0	0	1,535	269	0
Transitional Material	k tonnes	**1,703**	0	0	0	0	0	0	0	530	1,173	0
Fresh Material	k tonnes	**517**	0	0	0	0	0	0	0	1	517	0
Total Heap Leach Feed	k tonnes	**4,025**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2,066**	**1,959**	**0**
	g/t	0.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82	1.00	0.00
Total Waste	k tonnes	**17,844**	**0**	**0**	**0**	**0**	**0**	**0**	**3,654**	**9,246**	**4,944**	**0**
Total Material	k tonnes	**21,869**	**0**	**0**	**0**	**0**	**0**	**0**	**3,654**	**11,312**	**6,904**	**0**

The overall strip ratio is 3.16 tonnes of Waste material to 1 tonne of heap leach material. The mine life for the 3 Mt/a scenario is 8.7 years.

The mine design consists of several discrete open pits from the Boin, Sewum, and Nyamebekyere deposit areas. Figure 25.1 summarizes the composition of the total heap leach feed tonnes by mining area and by material type.

Figure 25.1 LOM Mine Plan, Heap Leach Feed Composition



As shown, Boin and Sewum deposit areas contribute the majority of tonnes to the heap leach. Similarly, the oxide material type is the majority component of the heap leach feed.

Waste rock will be stored in waste dumps, which have been conceptually designed for the PEA at locations which minimized haul cycle times. There have been no geotechnical investigations conducted to date. Where possible, waste will be placed in mined out pits to reduce closure costs and reduce the project footprint.

An operating cost model was developed to estimate the mining costs. The mine operating cost is largely driven by the haulage cost component, which is influenced by the fuel price assumptions as well as the longer hauls for the heap leach feed material from the pit exit to the primary crusher location.

For the Owner Operated scenario, mining equipment is estimated to cost US$38.1 million to purchase over the life of the mine. For the PEA, leasing of mining equipment has not been considered; this would reduce Capital costs but increase operating costs.

25.2.1 RISKS

The following are identified risks to the aspects of the Mine Design and Mine Plan.

→ Mine Plan assumed oxide material and 50% of transitional material would be free digging and not require any blasting. Future test work will be required to validate these assumptions in future studies.

- Mine plan assumed oxide and transitional material would have overall recovery of 75% and fresh material would have overall recovery of 73%. Further metallurgical test work is required to support these assumptions.
- Assumptions were made, based on engineering experience, for the overall pit slope angles. No geotechnical or hydrogeological test work has been conducted to date.

25.3 MINERAL PROCESSING AND RECOVERY METHODS

WSP concludes the following with respect to mineral processing and recovery methods.

- Preliminary test work was carried out by Edgewater and SGS in 2012, with initial bottle roll tests indicating that cyanide leaching may be a viable option for the extraction of gold from the oxide domains. While helpful as a guide for cyanide solubility, the bottle roll tests are preliminary and are not sufficient to make any meaningful conclusions on the metallurgy of the three zones involved in the Enchi Gold Project.
- For the purposes of this study, heap leaching has been selected as the preferred process option, although further work on particle size for optimal leach performance and physical constraints associated with heap leaching is still required to definitively select this as the most suitable option.
- Good recoveries were achieved from the Boin and Nyamebekyere samples, averaging 87% and 70% respectively, while only one sample from Sewum indicated a recovery of 67%. The remaining samples from Sewum showed poor recoveries.
- A conservative overall gold recovery of 75% was used to develop the process design criteria. With the introduction of fresh material to the ROM, it is assumed the overall recovery will drop to 73%. Although consistent with typical heap leaching operations of similar oxide and transition mineralization, this will have to be confirmed with metallurgical test work.
- A conventional heap leaching facility was sized to process 3 Mt/a of ROM material, including primary and secondary crushing, agglomeration, moveable heap stacking, leached solution collection ponds, and gold recovery plant. The heap leach pads and recovery plant will operate year-round while crushing, agglomeration, and stacking will be shut down during wet weather periods.
- Assumptions were made with regards to heap leach pad and back-end recoveries for an overall recovery of 75%, particle grind size P_{80} of 25 mm, heap leach time of 90 days, as well as pad dimensions and reagents consumptions in line with typical gold heap leach operations.

25.4 INFRASTRUCTURE

The preliminary design of the supporting infrastructure for the Project has been carried out in sufficient detail to arrive at cost estimates of appropriate accuracy for study of this nature. All designs, calculations, and assumptions are based on the limited available terrain data and hands-on experience from working on similar projects in Ghana.

Important items that still need to be finalised are the negotiations for a connection to the national HV power grid and the condition and availability of facilities for the mining staff in Enchi village.

25.5 ENVIRONMENTAL

The most significant potential environmental and social issues are likely to be related to water management, social-economic impacts, and post mine closure expectations. These issues are likely to either be of key concern to local communities and / or likely to have cost implications in respect of impact management during the operational and closure phases.

The Project will trigger a range of regulatory requirements and processes, which will require the application for, receipt of, and compliance with a variety of environmental permits and approvals from the relevant Ghanaian authorities.

Closure objectives should be defined early in the mine planning process and integrated into all activities throughout the Life-of-Mine.

25.6 ECONOMIC ANALYSIS

The PEA is based on the proposed successive open-pit mining of the Sewum, Boin, and Nyamebekyere deposits. The target production rate during the life of the mine is 3.0 million tonnes per year with no more than two open pits producing concurrently except during Year 7 where all three deposit areas will briefly be in operation (one in stripping phase).

The proposed Project process plant design will be based on gold heap leach technology, which will consist of crushing, agglomeration, stacking, and heap leaching with cyanide solution, adsorption of the pregnant solution, elution and gold smelting.

The results of the PEA comprise the following.

- Owner Operated Scenario:
  - Based on a gold price of US$1,300 per troy ounce, the Project has a pre-tax internal rate of return (“IRR”) of 34% and pre-tax net present value (“NPV”) of US$102 million, at a 5% discount rate.
  - Based on a gold price of US$1,300 per troy ounce, the Project has a Post-tax internal rate of return (“IRR”) of 25% and a Post-tax net present value (“NPV”) of US$62 million, at a 5% discount rate.
  - Pre-tax payback period is 2.8 years and Post-tax payback period is 3.4 years.
- Contract Mining Scenario:
  - Based on a gold price of US$1,300 per troy ounce, the Project has a pre-tax internal rate of return (“IRR”) of 44% and pre-tax net present value (“NPV”) of US$73.4 million, at a 5% discount rate.
  - Based on a gold price of US$1,300 per troy ounce, the Project has a Post-tax internal rate of return (“IRR”) of 31% and a Post-tax net present value (“NPV”) of US$44.8 million, at a 5% discount rate.
  - Pre-tax payback period is 2.3 years and Post-tax payback period is 2.6 years.
- The Contract Mining scenario provides a higher IRR but a lower NPV.
- The payback period (measured in years from start of construction) is shorter with the Contract Mining scenario.

- Gold production will average 61,749 troy ounces per annum and 538,450 troy ounces over the 8.7-year mine life.

25.7 RISK AND OPPORTUNITIES

Opportunities to improve the Project economics include the following.

- The potential to utilize Contract Mining in order to reduce up-front capital requirements.
- The resources of all three zones remain open along strike and in the down-dip directions.
- Numerous other prospects on the Properties that could eventually be integrated into mineral resources.
- Should the project mine life increase with additional mineral resources, the potential to transfer into Owner Operated mode once the project has made some revenues.
- Test work for process options could include cyanide free technologies that are more environmentally friendly in addition to provide good gold recovery in various types of materials (oxides, sulphides, etc.).

Risks requiring mitigation strategies include the following.

- The Issuer's future financial success depends on the ability to raise additional capital from the issue of shares or the discovery of property which could be economically justifiable to develop. Such development could take years to complete and resulting income, if any, is difficult to determine. The sales value of any mineralization potentially discovered by the Issuer is largely dependent upon factors beyond the Issuer's control, such as the market value of the products produced.
- The resource exploration industry is an inherently risky business with significant capital expenditures and volatile metals markets. The marketability of any minerals discovered may be affected by numerous factors that are beyond the Issuer's control and which cannot be predicted, such as market fluctuations, mineral markets and processing equipment, and changes to government regulations, including those relating to royalties, allowable production, importing and exporting of minerals, and environmental protection.
- This industry is intensely competitive and there is no guarantee that, even if commercial quantities are discovered, a profitable market will exist for their sale. The Issuer competes with other junior exploration companies for the acquisition of mineral claims as well for the engagement of qualified contractors. Metal prices have fluctuated widely in recent years, and they are determined in international markets over which the Issuer has no influence.
- Exploration and development on the Issuer's Property are affected by government regulations relating to such matters as environmental protection, health, safety and labour, mining law reform, restrictions on production, price control, tax increases, maintenance of claims, and tenure. There is no assurance that future changes in such regulations would not result in additional expenses and Capital expenditures, decreasing availability of capital, increased competition, title risks, and delays in operations.
- Availability of electric power on time for the construction of the project. Contracts will have to be in place between Ghanaian electric companies (e.g.: Ghana Grid Company) and Pinecrest.

- Management of construction/engineering and procurement schedules, costs, and cost containment.
- Operating risks related to recruitment and training of mine workforce.
- Permitting risks.
- Pit slope design through geo-mechanics characterization and stability analysis.
- Possibilities that the population does not accept the mining project.

These risks are common for this stage of gold projects and are similar risk factors to other gold projects of this stage and nature.

26 RECOMMENDATIONS

It is WSP's opinion that additional exploration and engineering test work expenditures are warranted to improve the understanding of the Project and delineate additional resources. The following recommendations and budgets have been determined based on advancing the Project to a pre-feasibility level study.

Further economic evaluation beyond a PEA level study will require converting inferred resources to indicated and/or measured resource classifications. The recommendations for the Project are mainly concerned with confirming the assumptions used within the PEA study specifically with respect to mineral processing and recovery, geotechnical, and hydrogeological studies. Tables 26.1 and 26.2 summarize the estimated costs.

Table 26.1 Phase 1 Budget

Program	Cost (US$)
Metallurgical Test Program	300,000
Total	**300,000**

Table 26.2 Phase 2 Budget

Program	Cost (US$)
Reverse circulation drilling 8,500 m @ $80/m	680,000
Diamond drilling 4,000 m @ $190/m	760,000
Compensation (drilling)	175,000
Topographic Survey/LIDAR	165,000
Environmental Impact Assessment	150,000
Geotechnical Assessment (open pit & site)	120,000
Pre-feasibility Study	750,000
Total	**2,800,000**

26.1 GEOLOGY AND MINERAL RESOURCES

The drill program is planned to increase the confidence of the resource by improving resource categories as well as to further advance the project based on the recommendations from the PEA study.

The drill program is suggested to improve the geometry of the mineralization as well as the grade distribution within the deposit. The diamond drilling is required to further understand the structural complexity of the deposits. The reverse circulation drilling allows for low-cost drilling for grade distribution.

The line item of compensation in the budget is paid to plantation owners for the destruction of coca trees in order to set up drill pads and access roads.

A high-resolution topographic survey, such as Light Detection and Ranging (LIDAR), should be flown over the Property to generate a topographic base. One of the steps required before the resource can be improved beyond the Inferred classification, is that all the collar elevations on the Property need to be corrected.

26.1.1 OTHER RECOMMENDATIONS

The following recommendations are based on observations by WSP during the site visit or during the resource estimation process. These recommendations are suggestions to policy and procedures conducted by Pinecrest.

- A detailed elevation survey of the Property is strongly recommended. The current uncertainty in collar elevation is one of the reasons that the resources are classified as Inferred. Complete a LIDAR or airborne topographic survey of the Project area and then adjust all the collar elevations to the new topographic file.
- On all future drilling programs, the company should collect SG samples from the various rock types and oxide domains (including waste rock units). A minimum of 2% of the total drillhole dataset should contain SG data.
- Downhole televiewer surveys should be considered for selected boreholes to acquire appropriate geotechnical data. This data would be utilized in future pit designs.
- Current logs contain incorrect collar information and can be misleading during the validation process. Drill logs require updating with correct information.

26.2 MINING AND PROJECT INFRASTRUCTURE

WSP recommends the following with respect to the mine plan and design and project infrastructure.

- Initiate geotechnical studies for major surface infrastructure including heap leach pad and facilities, waste material storage areas, and roads.
- Initiate geotechnical studies for pit slope stability assessment.
- Initiate hydrogeological program to quantify the pit dewatering requirements.
- Initiate geochemical studies to determine potential Acid Rock Drainage (ARD) and Metal Leaching (ML) potential of the various rock types.
- Conduct condemnation drilling to facilitate locating waste storage areas and other infrastructure.
- Borrow source investigation including geotechnical laboratory testing for construction materials.
- Review and optimize the haulage cycles, including pit exit locations, and equipment selections.
- Review pit optimization, mine design and mine plan. Within the mine planning work, investigate options for providing opportunities for backfilling pits with waste material.
- Review and refine site layout and central processing facility location at the next level of study in order to optimize haulage plans with facility layouts.

- Prior to the commencement of any further design of the road network for the mine infrastructure, additional testing will be required to evaluate the in situ material conditions, founding conditions for minor structures, and availability of road building material. These tests will include a centreline investigation of the road alignments and the sourcing of road building material. Based on previous experience in West Africa, it is estimated that the cost of this work will be between $150,000 and $200,000 depending on the final prices received from the local laboratories in Ghana.
- As the project study advances and the project scope becomes better defined, begin negotiations with mining contractors to allow for firmer pricing and conduct a detailed trade-off study between Owner Operated and Contract Mining.

26.3 MINERAL PROCESSING AND RECOVERY METHODS

WSP recommends the following with respect to mineral processing and recovery methods.

- An understanding of the morphology of the gold particles in their host mineral is essential in the development of the most effective process route to extract the metal values. In addition to multi-element analysis, microscopic gold scanning should be carried out to verify the dimensions of gold grains and their occurrence (e.g., liberated, attached or locked). If the gold is encapsulated, attached or locked, the association with its host mineral must be described. Depending on the particle size of the gold in the oxide domain and its occurrence, it may be predicted whether the material would have to be milled to a finer particle or grind size to expose a sufficient amount of gold particle surfaces to the cyanide solution in order to achieve acceptable recoveries. Samples from the oxide, transition, and sulphide zones should be submitted to the laboratory to determine these characteristics.
- Column leach tests must be conducted on composite samples representing each zone to simulate heap leach conditions. The tests should determine average gold recovery at different leach times until recovery stabilizes, producing a recovery curve. The consumption requirements for sodium cyanide, lime, and cement for agglomeration should also be optimized. Important aspects for a successful heap leach operation such as particle size, heap height, solution application rate, agglomeration parameters and similar variables will determine optimum heap stability, permeability, porosity, and recovery. The physical characteristics of the mineralized material should be analysed during column leach tests by the laboratory. It will also be necessary to look at the gold morphology on the tailings material after heap leach to understand the gold losses and improve overall treatment.
- Coarse and fine bottle roll leach tests should be conducted on the same composite samples to simulate conventional gold extraction operations. The tests should determine average gold recovery at different particle sizes and leach times until recovery stabilizes. Reagents consumption optimization should also be analysed. These tests will confirm whether there is a progressive increase in recovery of gold as the material is milled to finer particles sizes and will also suggest the degree of liberation of gold particles. The effect of grind is therefore an important parameter in optimizing the process flow sheet. If gold particles are coarse, a front-end gravity recovery option should also be considered.
- Comminution test work including Bond Crushability Work Index (CWi) and Abrasion Index (Ai) should be conducted on the composite samples to determine design conditions for particle reduction of the potential ore.

- Agglomeration and percolation test work should be conducted to determine optimum binding agent requirements and irrigation flow rate.
- Other characteristics that will affect the process flow sheet and equipment design should be evaluated by the laboratory; these include:
  - Porosity of the material which will affect the efficiency of the heap leach operation.
  - Clay content in the material which can increase the probability of 'rat-holing' or short circuiting of fluid through the bed of material and blocking the solution flow, thus reducing the overall gold recovery or will increase leach times and solution losses. Typically high in saprolites, the clay fines may need to be removed through screening prior to stacking on the heap. Equipment selection and design will have to be evaluated as the fine clay will easily blind vibrating screens during wet weather conditions.
  - Carbonaceous material content will have a ''preg-robbing'' effect as it tends to adsorb dissolved gold from the leach solution thereby reducing gold recovery.
- A review of the Project area for suitable materials to construct the heap leach pads is recommended. This includes gravel, sand, and clay materials that can be utilized for the construction of the overliners.
- It is advisable to undertake some geotechnical testing of the ground conditions from selection of suitable plant, infrastructure, and leach pad locations.
- For the latter stages of the mine life, the zones transition to an un-oxidized rock type which typically requires milling to less than 75 microns for optimum recovery of gold with conventional carbon in leach. To study the metallurgical behaviour of the oxide, transition and fresh zones, a complete test program should be anticipated including Comminution, Head Analysis, Gravity Amenability, Dissolution appraisal of gravity tails, Flotation of gravity tails, and Dissolution appraisal of flotation concentrate.
- Cyanide destruction tests should be conducted to evaluate and optimize detoxification conditions and reagents consumption as well as concentration of other metals in the discharge water to evaluate the requirements for a mine water treatment plant.

It is estimated to cost about US$300,000 to advance the study through the recommended test work.

26.4 ENVIRONMENTAL STUDIES, PERMITTING, AND SOCIAL OR COMMUNITY IMPACTS

As the program advances past the PEA stage, an Environmental Impact Assessment should be initiated and discussion with local communities should be initiated.

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- http:/www.kitco.com for historical metal pricing.

28 CERTIFICATES OF QUALIFIED PERSONS

TODD MCCRACKEN, P. GEO

I, Todd McCracken, P. Geo., of Sudbury, Ontario do hereby certify:

- I am the Manager -Geology with WSP Canada Inc. with a business address at Unit 2, 2565 Kingsway, Sudbury, Ontario.
- This certificate applies to the technical report entitled Technical Report and Update of the Preliminary Economic Assessment on the Enchi Gold Project (the “Technical Report”), with an effective date of June 30, 2015.
- I am a graduate of the University of Waterloo with a Bachelor of Science degree in1992. I am a member in good standing of Association of Professional Geoscientists of Ontario, license 0631. My relevant experience includes 24 years of experience in exploration and operations, including several years working in shear-hosted gold deposits. I also have 9 years of experience completing resource estimation and block models. I am a “Qualified Person” for the purposes of National Instrument 43-101 (the “Instrument”).
- My most recent personal inspection of the Property was from April 28 to May 1, 2014, inclusive.
- I am responsible for Sections 2, 4 to 12, 14, 23, 24, 27 and parts of 3, 25 and 26 of the Technical Report.
- I am independent of Edgewater Exploration and Pinecrest Resources as defined by Section 1.5 of the Instrument.
- I have prior involvement with the Property that is the subject of the Technical Report, having authored two previous technical reports in 2010 and 2012.
- I have read the Instrument and the sections of the Technical Report that I am responsible for have been prepared in compliance with the Instrument.
- As of the date of this certificate, to the best of my knowledge, information, and belief, the sections of the Technical Report that I am responsible for contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Signed and dated this 27th day of January, 2016 at Sudbury, Ontario.

“Original document signed and stamped by Todd McCracken, P.Geo.”

Todd McCracken, P.Geo.
Manager - Geology
WSP Canada Inc.

JOANNE ROBINSON, P. ENG.

I, Joanne Robinson, P.Eng., of Toronto, Ontario do hereby certify:

- I am a Mining Engineer with WSP Canada Inc. with a business address at 1300 Yonge St., Suite 801, Toronto, Ontario, M4T 1X3.
- This certificate applies to the technical report entitled Technical Report and Update of the Preliminary Economic Assessment on the Enchi Gold Project (the “Technical Report”), with an effective date of June 30, 2015.
- I am a graduate of Queen’s University with a Bachelor of Science in Mining Engineering. I am a member in good standing of the Association of Professional Engineers of Ontario (PEO), License Number 100049603. I have been working as a mining engineer from 1997 to 2000 and 2004 to present. My relevant experience includes 7 years working at various Canadian open pit operations in progressively senior roles doing production engineering, mine design, and mine planning, over 3 years with an open pit mine development project focusing on the pit optimization, mine design, mine planning, cost estimation, and project management, and over 2 years in mine consulting completing the open pit mine design, optimization, planning, and mine cost estimation aspects for a number of technical studies I am a “Qualified Person” for the purposes of National Instrument 43-101 (the “Instrument”).
- I have visited the Project property on September 23, 2014.
- I am responsible for Sections 1, 15, 16 and parts of 21, 25 and 26 of the Technical Report.
- I am independent of Pinecrest Resources as defined by Section 1.5 of the Instrument.
- I have no prior involvement with the Property.
- I have read the Instrument and the sections of the Technical Report that I am responsible for have been prepared in compliance with the Instrument.
- As of the date of this certificate, to the best of my knowledge, information, and belief, the sections of the Technical Report that I am responsible for contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Signed and dated this 27th day of January, 2016 at Toronto, Ontario.

“Original document signed and stamped by Joanne Robinson, P.Eng.”

Joanne Robinson, P.Eng.
Principal Mining Engineer
WSP Canada Inc.

MIRENO DHE PAGANON, ENG.

I, Mireno Dhe Paganon, Eng., of Kirkland, Quebec do hereby certify:

- I am Process Engineer with WSP Canada Inc. with a business address at 1600, boul. Rene-Levesque, Montréal, Québec H3H 1P9.
- This certificate applies to the technical report entitled Technical Report and Update of the Preliminary Economic Assessment on the Enchi Gold Project (the "Technical Report"), with an effective date of June 30, 2015.
- I am a graduate of the University of McGill with a Bachelor of Engineering in Metallurgy. I am a member in good standing of Association of Ordre des ingénieurs du Québec (OIQ), license 118862. My relevant experience includes 22 years of experience in mineral processing, aggregate, chemical industries. I am a "Qualified Person" for the purposes of National Instrument 43-101 (the "Instrument").
- I have not visited the Project property.
- I am responsible for Sections 13 and 17 and parts of 21, 25 and 26 of the Technical Report.
- I am independent of Pinecrest Resources as defined by Section 1.5 of the Instrument.
- I have no prior involvement with the Property.
- I have read the Instrument and the sections of the Technical Report that I am responsible for have been prepared in compliance with the Instrument.
- As of the date of this certificate, to the best of my knowledge, information, and belief, the sections of the Technical Report that I am responsible for contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Signed and dated this 27th day of January, 2016 at Kirkland, Quebec.

"Original document signed and stamped by Mireno Dhe Paganon, Eng."

Mireno Dhe Paganon, Eng.
Process Engineer
WSP Canada Inc.

BRUCE WHITE, PR.ENG.

I, Bruce White, Pr.Eng., Development, Transportation and Infrastructure, Africa, do hereby certify that:

- I am a civil engineer with WSP Group Africa (Pty) Ltd, Development, Transportation, and Infrastructure, with a business address at South View, Bryanston Place Office Park, 199 Bryanston Drive, Bryanston, 2191.
- This certificate applies to the technical report entitled Technical Report and Update of the Preliminary Economic Assessment on the Enchi Gold Project (the "Technical Report"), with an effective date of June 30, 2015, prepared by WSP Canada Inc.
- I am a graduate of the University of Pretoria, South Africa, (Bing, Civil Engineering, 1995). I am a member of the Engineering Council of South Africa (South Africa, 20130354) and a member of the South African Institute of Civil Engineering (2011935). My relevant work experience includes 15 years' experience in the roads engineering sector. I have worked on municipal and provincial roads, and extensively on national highways. My experience includes the geometric design, contract management and administration, site supervision and construction management of new roads, road rehabilitation, road upgrades and highway interchanges, and road related infrastructure. Countries of work experience include South Africa, Lesotho, Mozambique, and Democratic Republic of Congo.
- By reason of my education, affiliation with a professional association and past relevant work experience, I am a "qualified person" for the purposes of National Instrument 43-101- "Standards of Disclosure for Mineral Projects" ("NI 43-101").
- I have not visited the Project property.
- I am responsible for Section 18 - Project Infrastructure.
- I am independent of Pinecrest Resources Ltd. as described by Section 1.5 of Nl 43-101.
- I have had no prior involvement with the property that is the subject of the Technical Report.
- I have read Nl 43-101 and the parts of the Technical Report that I am responsible for have been prepared in compliance with Nl 43-101.
- At the effective date of the Technical Report, to the best of my knowledge, information and belief, the parts of the Technical Report that I am responsible for contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Signed and dated this 27th day of January, 2016 at 199 Bryanston Drive, Bryanston, South Africa.

"Original document signed and stamped by Bruce White, Pr.Eng."

Bruce White, Pr.Eng.
Senior Associate
WSP Group Africa (Pty) Ltd.

JEAN-SÉBASTIEN HOULE, ENG.

I, Jean-Sébastien Houle, Eng., of Sherbrooke, Quebec, Canada do hereby certify:

- I am Project Manager with WSP Canada Inc. with a business address at 171, Léger Street, Sherbrooke, Québec, Canada J1L 1M2.
- This certificate applies to the technical report entitled Technical Report and Update of the Preliminary Economic Assessment on the Enchi Gold Project (the "Technical Report"), with an effective date of June 30, 2015.
- I am a graduate from Université Laval, Québec, Canada, with a Coop Bachelor's degree in Mining and Mineral Processing Engineering obtained in 2000. I am a member in good standing of the Ordre des Ingénieurs du Québec (no. 129263). My relevant experience includes 12 years of experience in the mining industry including many projects involving mining environment, closure and remediation and economics. I am a "Qualified Person" for the purposes of National Instrument 43-101 (the "Instrument").
- I am responsible for Sections 19, 20, 22 and parts of Sections 1, 3, 21, 25 and 26 of the Technical Report.
- I am independent of Pinecrest Resources as defined by Section 1.5 of the Instrument.
- I have no prior involvement with the Property.
- I have read the Instrument and the sections of the Technical Report that I am responsible for have been prepared in compliance with the Instrument.
- As of the date of this certificate, to the best of my knowledge, information, and belief, the sections of the Technical Report that I am responsible for contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Signed and dated this 27th day of January, 2016 at Sherbrooke, Quebec, Canada.

"Original document signed and stamped by Jean-Sébastien Houle, Eng."

Jean-Sébastien Houle, Eng.
Project Director
WSP Canada Inc.